Stiffening the Sinews of the Nations:

Economic Infrastructure in the United States, United Kingdom and Canada

by Simon Webley

BRITISH-NORTH AMERICAN COMMITTEE

86-03731/

The British-North American Committee

At the Committee's first meeting in New York City, December 1969, the following statement of its aims was authorised:

The British-North American Committee has been established to study and comment upon the developing relationships between Britain, the United States and Canada. It seeks to promote clearer understanding of the economic opportunities and problems facing the three countries, to explore areas of co-operation and of possible friction, and to discover constructive responses. It believes that sound relations between these three countries in the context of an increasingly interrelated world are essential to future prosperity and seeks to promote better understanding through the collection of facts and their widespread dissemination.

During the sixteen years since then, the Committee has broadly maintained these aims and has sponsored a series of objective studies undertaken by qualified experts in the three countries and published with the Committee's approval. On the basis of these factual studies and of discussions at its meeting, the Committee has also issued policy statements signed by its members.

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Sponsored by
British-North American Research Association (UK)
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ISBN 0-902594-45-1

Published by the British-North American Committee

Printed and bound in the United Kingdom by
Contemprint Limited, London SE1

December 1985

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Statement of the British-North American Committee to Accompany the Report

Members of the British-North American Committee have become increasingly aware in recent years that the efficiency of the public works in their respective countries is an important factor in the ability of the business sector to deliver products and services in a manner which meets the demanding standards being set by international competition.

The public works in question range from trunk road systems to the provision of clean water and have become known colloquially as 'economic infrastructure'. In discussions at its bi-annual meetings, members of the British-North American Committee have explored the different ways in which the United Kingdom, the United States and Canada approach the refurbishment and extension of these services. We have been impressed with the volume and thoroughness of many recent studies about the subject in the United Kingdom and the United States and some of the responses to them. But we are not convinced that our respective governments have yet realised the seriousness of the situation that is arising in many areas because of what appears to be inadequate maintenance and an unco-ordinated approach to the provision of new or extended facilities.

While much of the debate has been focussed on the job creation potential of major programmes to renew infrastructure (and we do not underestimate its importance), we are particularly concerned that a more systematic approach be adopted to the renovation of our national assets as a need in its own right.

We note that in Canada there is little public concern at present concerning the physical condition of its economic infrastructure. This is due partly to the comparative newness of many of the systems and partly to an objective and long term approach in the major cities to their service needs.

We believe, however, that the situation which now prevails in the United Kingdom, the United States and many other industrialised nations may well begin to emerge in Canada as the facilities, particularly those which were put in place in the inter-war years, require renewal or replacement. It is not too early to address this issue.

In the following Report, Simon Webley, the Committee's British Director, comes to an important conclusion. After reviewing the principal current studies on the subject, he finds the present situation serious enough to suggest the establishment of independent, permanent bodies or commissions concerned with economic infrastructure in each of our countries both at the national, and where feasible, local levels. These would assess comprehensively the state of present economic infrastructure; set objective standards for existing and new facilities; and devise effective ways to finance the

maintenance, renewal and provision of what he calls 'the nation's sinews.'

The British-North American Committee endorses the author's recommendation to our respective governments and commends the paper for wider consideration of this important topic.

Footnote to the Statement as a whole

Many of these infrastructure investments can be more effectively managed by the private sector. This is particularly applicable in solid waste disposal and sewerage. Competitive free market forces can undoubtedly be mobilised to furnish other infrastructure services and this should be carefully examined. In all cases, operating and capital costs of infrastructure should, to the greatest practical extent, be borne by users. **Edward Donley**

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Author's Acknowledgements

In writing this paper I would like to acknowledge the considerable help and encouragement of members of the British-North American Committee, especially that of Sandy Marshall who chaired the task force responsible for guiding it. W. A. P. Manser provided invaluable assistance in the early stages of the project and with the appendix. Pat Choate, Deborah Matz, Nan Humphries, Nestor Terleckyj, Susan Hart, Crystal Campbell, Wendy Dobson and Ted Carmichael and particularly Sperry Lea were among those who made helpful suggestions and comments for which I am grateful. The responsibility for the content must however remain mine!

Hilary and Melanie typed many versions of different chapters and I must thank them for their patience.

SIMON WEBLEY
November 1st, 1985
London

. . . Stiffen the Sinews, . . .

William Shakespeare
Henry V, Act 3, Scene 1

Stiffening the Sinews of the Nations

by

Simon Webley

PREFACE

It has been alleged by a growing variety of public bodies and institutions, particularly in the United States and the United Kingdom, that their respective governments are neglecting to repair, replace and enhance the public plant and facilities – the Sinews of the Nations – in an adequate or systematic way[1]. In Canada, some are wondering if the federal government will be able to avoid a similar situation from arising in their country.

This neglect, it is argued, will lead to a gradual but inexorable decline in the effectiveness of public services and, if allowed to continue, will become an increasingly significant factor in national economic performance.

The term 'infrastructure' has been coined to describe the network of public works which are basic to the economic and social life of any nation state. Such facilities have grown up over a considerable period and in a rather haphazard way, with portions added piecemeal largely in response to demand. Some are the responsibility of national governments, while others are provided by regional authorities. Chart I sets out those which are most commonly accepted as covered by the term and have been classified to indicate their main purposes.

This paper concentrates on the infrastructure that is used predominantly for economic purposes rather than that which might be described as social. This distinction is somewhat arbitrary and does not mean that the latter can be neglected in order to enhance the former. Nonetheless, it is the state of economic infrastructure that we neglect at our peril; when these facilities are allowed to deteriorate or we fail to up-date them regularly, the costs become increasingly evident. Those who rely on infrastrucure for their personal or commercial needs will suffer inferior quality and/or interrupted services; in turn, the direct and indirect costs of repairs and alternative services will be reflected in prices of products. The ultimate and greatest cost will be exacted as inefficiency in infrastructure becomes an additional factor helping to undermine the

1 For instance, the Confederation of British Industry and the Trades Union Congress in Britain, the Joint Economic Committee of the United States Congress and the National Academy of Engineering in the United States.

Chart I

THE INFRASTRUCTURE OF A NATION

ECONOMIC INFRASTRUCTURE

A. Surface Transport Routes
- 1 Roads and Bridges
- 2 Rail and Other Public Transport
- 3 Inland Waterways, Dams and Locks

B. Water
- 1 Fresh Water Supply and Distribution
- 2 Waste Water (Sewerage)
- 3 Land Drainage and Flood Protection

C. Energy Distribution Network
- 1 Electric Transmission Lines
- 2 Gas and Crude Oil Pipelines

D. Air and Sea Transport Terminals

II SOCIAL INFRASTRUCTURE

A. Public Buildings
(Prisons, Fire Stations, Hospitals, Schools, Social and Leisure Facilities)

B. Public Housing

C. Public Parks, etc.

---

competitive position of our respective nations. That is the focus of most studies and statements on this issue[2].

Recent research in the US and UK has attempted to estimate the size and scope of these nations'infrastructures and to assess their respective worth. Severe difficulties have been encountered, particularly in the United Kingdom, because, for example, even the location of some century-old underground piping is not accurately mapped. Analysis of public sector expenditure on infrastructure over several decades remains the predominant means of assessing alterations in the size and pattern of public works but this method is at best only indicative.

This study reviews the state of the basic economic infrastructure in North America and in the United Kingdom, the consequence of its neglect, and concern which this issue has aroused.

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2 See, for instance, Choate & Walter: *America in Ruins*, Council of State Planning Agencies, Washington DC, 1981, *First Report of the Infrastructure Planning Group*, The Institution of Civil Engineers, London, 1984, *Investment in the Public Sector Built Infrastructure*, NEDO, London, 1985, *A Concensus on Rebuilding America's Vital Public Facilities*, The Labour-Management Group, Washington DC, 1983.

It begins by explaining what is meant by infrastructure and why its apparent neglect has become an issue. It goes on to describe the deterioration in the facilities and looks at a principal cause: the steady shrinkage of public expenditure on economic infrastructure. It then examines the mechanism through which the responsible authorities determine the level of public expenditure, it considers the defects of this mechanism as evident in the allocation (or withholding) of funds for public works and then offers some explanations of why infrastructural spending appears to have been substantially reduced over recent years at least in the UK and US.

Two questions which are raised when proposals are made for rectifying infrastructural deficiencies are its effects on employment and inflation. Both are held to vary with changes in the levels and patterns of public expenditure and may, therefore, be affected by any re-allocation of resources. A short appendix addresses these matters.

The Paper concludes by suggesting a practical way forward in the three countries from which members of the British-North American Committee are drawn: namely the setting up of a high level, permanent and independent body in each country with terms of reference to include an annual report on the state of the nation's infrastructure and setting priorities which should be given to different types of public works.

CHAPTER I

The Infrastructure Issue

INTRODUCTION

The assertion that the basic infrastructure of the developed economies, including the US, the UK and, to a lesser extent, Canada, is both deteriorating and inadequate in a number of important respects, is now heard more often than in previous decades and has become a matter of some public concern.

Recent studies and reports in the US and UK have been emphasising the inadequate, largely haphazard and unco-ordinated way in which the State either at national or at local level provides for the continuity and expansion of the surface and underground systems upon which we have come to rely.

The labour unions among others have pointed out the incongruity of, on the one hand, a high level of unemployment with its resulting cost to public funds and, on the other, the obvious deficiencies in, for instance, the repair of roads which could be mended by some of those who register for welfare benefits. Their arguments emphasise a classical counter-cyclical solution to the problems arising at the nadir of business cycles; they advocate spending by governments principally on public works such as infrastructure renewal to generate employment. In so doing they draw attention to the obvious deficiencies in the infrastructure[1].

On the other hand, the major private institutes whose members are involved with the provision of public works of various sorts have a different perspective on the infrastructure issue. They see the unused capacity of, for instance, civil engineers, construction companies and ancillary services as both a waste and a potential threat to their members' viability. Their case, which is usually well documented and presented, not only sets out in detail what they consider to be inadequacies but also puts the argument for the enhancing of existing infrastructure, usually providing quite detailed plans for a number of years ahead[2]. Although these sources might be thought to have a vested interest in expanded expenditure on public works, the main argument they deploy and the evidence they provide about the current state of the infrastructure, cannot be ignored.

A third group of protagonists is made up of those public and private authorities to whom is delegated the responsibility of actually providing

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1 See, for instance, *Reconstruction of Britain*, Trades Union Congress, London, 1983, and AFL-CIO News, Washington DC, January 8th, 1983.

2 See, for instance, *Challenge and Opportunity*, British Road Federation, London, 1984, and *America's Infrastructure, a Plan to Rebuild*, Associated General Contractors of America, Washington DC, 1983.

the services. Some are acutely aware of the inadequacy of some of the services they offer. For instance, the consistent reports of the North West Water Authority in the United Kingdom on the state of the waste water system in their area which includes Manchester, were instrumental in drawing public attention to what was a nation-wide problem. In North America the recent reports of equivalent authorities have served to draw public and legislator attention to the issues. Their findings have been brought home to public consciousness by the dramatic failure of, for instance, a bridge on the New England Expressway north-east of New York, the closure of the Wilson Bridge in Washington DC, and in Canada, the snapping of a shaft on the Valley Field Bridge over the St. Lawrence Seaway in November 1984 and the Welland Canal problem in October 1985.

Whatever the perspective of the complainant, the issue of infrastructure maintenance and renewal can no longer be ignored especially in the United States and the United Kingdom.

HISTORIC PERSPECTIVE

The term 'infrastructure' is a modern, even a post-war invention. But the problem of infrastructure decay, maintenance and development is not new.

Europe

Roman water systems were constructed throughout the Empire to carry fresh water to towns via aquaducts. Waste has been carried away by water systems for at least 6000 years[3]. Roman towns throughout Britain, the farthest extent of its Empire, were carefully laid out and developed in a practical, functional manner to support the Roman legions which settled in Britain for 400 years to the early fifth century. With their departure went the desire for such an orderly organisation of habitat.

Roman-built roads, a limited but impressive network of arteries, were built for the particular purpose of enabling marching legions to move easily from one fortified town to another, and to this day a number of main roads follow their route. But the deplorable decay of English roads following the Roman withdrawal prompted a Tudor statute of 1555 which imposed a duty on parishes to repair and maintain roads. The statute had little effect as it was not enforced from the centre or implemented willingly by the parishioners. It was in the 17th century that the turnpike system was inaugurated marking the beginning of a deliberate policy for road construction suitable for coaches. Inter-city coach service began in the mid-17th century. Infrastructure maintenance

3 Labour Management Group, op.cit.

was sorely neglected, however, for by the beginning of the 18th century the condition of roads was worse than ever[4].

With the exception of Bath and York which were major Roman settlements and well-planned 17th century cities, most towns and villages were haphazardly evolved social enclaves. For instance, a Royal edict was issued within days of the Great Fire of London in 1666 preventing rebuilding except in accordance with a plan to be devised by Sir Christopher Wren with royal blessing; it was simply not implemented. Overcrowding, unsanitary conditions, and disorderly arrangement were a natural result of the English preference for individuality.

The saga of infrastructure development and decline usually begins with the Victorian era, but the Victorian experience for all of its revolutionary characteristics was not at all disconnected from the past. Wealth and scientific knowledge permitted development and planning but they did not necessarily proceed in tandem. Urban life was indeed transformed but not uniformly.

By the 1830s legislation was being passed by Parliament to mitigate the deprivation suffered by the poor in urban areas. However, public health-related public works were supported only when money was made available to do so; some cities were more able and some more willing. Great spurts of spending might be followed by decades of inactivity. Victorian cities can be studied as much for their different paces of development as for their common experiences[5].

Local councils and local leaders were generally preoccupied with the cost of social improvements in money terms rather than human cost terms. 'When Victorian legislation was passed which tampered with the rights of private property it was always contentious and difficult to implement[6].' Everywhere transport, railway, water, sewerage, and other public utilities were provided by private rather than public companies. It was the great cholera epidemics, which eventually affected those living away from the central city squalor, that ultimately resulted in London's modern sewerage system which through hundreds of miles of tunnels diverted human waste via the Thames to the sea. Parliamentarians personally offended by the stench of the Thames wafting through the halls of the Palace of Westminster finally sought some remedy.

By the 1870s the central government began to effect change. Grants-in-aid to municipalities increased markedly. In the early 1870s grants

4 E. A. Gutkind, *Urban Development in Western Europe: The Netherlands and Great Britain*, New York, 1971.

5 Asa Briggs, *Victorian Cities*, London, 1963.

6 Asa Briggs, op.cit.

from the exchequer to local authorities totalled about £1 million but amounted to nearly three times that by the end of the decade and almost £5 million by 1890[7]. The Transways Act of 1870 gave local authorities the option to buy out private tramway companies by compulsory purchase. The Sanitary Commission of 1869 to 1871 led to the creation of the Local Government Board in 1871 and to the Public Health Acts of 1872 and 1875. Action from the centre was needed to overcome the lack of implementation of earlier legislation by municipalities.

North America

The American experience reflects roughly similar trends and problems. One must, of course, keep in mind that American towns and cities are on the whole a newer phenomenon – there were no colonial settlements before the early 16th century and no English settlements before the first decade of the 17th. New York, Philadelphia and Boston are the oldest major cities and were established as seaports serving the trade needs of the colonists. Cities west of the Mississippi River developed as settlers gradually moved west, a phenomenon largely of the 19th century. It is difficult to find an American city that does not easily reflect a conscious plan, albeit something borrowed from European concepts and adapted to the New World.

The period of foundations can be dated from 1790-1855 and the period in which core infrastructure was constructed in central cities, from 1855-1910[8]. As with Victorian cities, American cities were profoundly affected by the introduction of tramways and railways. Railroads not only linked the hinterland to the seaports and manufacturing centres, but opened the 'Great American West'. The transformation of cities and of the continent occurred rapidly in the 19th century financed and promoted by private interests.

Government participation took place at the local and municipal levels; the American nation was founded upon the general mistrust of strong central power and the American pioneering spirit apotheosised individualism. Central control resided in State governments, such as it was. After 1825 State aid for public works increased; completion of the Erie Canal seemed to have spurred this spending on canals, roads and railroads. It has been calculated that between 1815 and 1860 about 73% of total investment in canal construction in six States was financed by State and municipal governments. State financing was often raised through bond issues sold to foreigners – the American nation owes a

7 Asa Briggs, op.cit.

8 Joel A. Tarr, The Evolution of the Urban Infrastructure in the Nineteenth and Twentieth Centuries in *Perspectives on Urban Infrastructure*, National Academy Press, Washington DC, 1984.

great deal to the City of London, figuratively speaking (although there were occasions of debt repudiation).

State government does seem to have exerted itself as planner, regulator, promoter and investor more effectively than in Britain, supplying the basis for further private activity. Nevertheless spurts of investment were followed by periods of retrenchment and these coincided with the ability to pay – a function of the economic cycle. Debt limits and pay-as-you-go restrictions imposed on State governments following depression periods seem to have restricted new undertakings. Municipal governments attempted to fill the breach, especially where transport links were involved. As in Britain, controversy developed over the relationship between tax revenues and financial obligations, which in the US were often incurred through the issue of railway bonds.

Public works projects were usually a direct response to voter demands.

While the better off often paid for their own street paving and services, their political influence was considerable. In Baltimore for example, water supply was privately provided until the middle of the 19th century. Philadelphia, on the other hand, constructed the first municipal water supply system as early as 1798, following a yellow fever epidemic.

In public health matters, such as water and sewerage, commercial and public interests coincided. Even where these services were provided by private companies, municipal authorities participated in developing systems, especially in the large cities and at an early date. When municipal tax revenues were inadequate, municipal bonds were issued to finance the projects. As population shifted from rural to urban areas and cities became more congested, and filthy, these infrastructure services became ever more important.

The severe economic recession in the 1870s held back the plans and it was not until the early part of this century that municipal authorities really set about tackling urban transport and hygiene problems in a systematic way. The larger, wealthier towns and cities of the North and East fared better in that the infrastructure was installed earlier and on a more substantial scale. It is perhaps significant that it is the US cities in the North and East that have recently been experiencing the more acute problems with their public works.

The American experience matches that of the Victorian era in Britain. Rapid growth and expansion of urban areas led to demands for investment in basic public works. Commercial prosperity it was argued, required investment in roads, railways and port facilities. The conflict between the demands for public works to sustain the urban masses, and those to promote commercial activity, was inevitable, especially as finance was limited by cyclical economic patterns as well as by political concern for economy. Nevertheless, gradually, urban centres were

developed, improved and expanded to provide the habitats in which the majority now live. However sophisticated our knowledge today may be concerning the infrastructure imperatives of the present and future, the problems of infrastructure building and maintenance are remarkably unchanging.

Canada

The growth of the major Canadian cities and the provision of their resultant infrastructure matched the experience of similar cities in the North East United States. One example illustrates the issues. In 1834, the garrison town of York, with a population of just over 9,000 was constituted into the City of Toronto. In 150 years its population has grown into some two million and its boundaries encompass a wide metropolitan area. This type of growth has generated a constant demand for improved centrally generated services. In 1907 a member of Parliament for Toronto was suggesting a subway to overcome the congestion (presumably of horse drawn vehicles) on the East-West route of that city which might enable people to travel as fast as thirty-eight miles an hour! By 1911, there was a strong call for a halt in extending Toronto's boundaries to annex more than the thirty communities which it had absorbed in the 1880-1910 period. This was based on the argument that the demand for services in the newly added residential sections 'burdens the general taxpayer with a portion of the cost entirely incommensurate with the advantage received therefrom [9]'.

The extensions to urban development increased as car ownership became widespread and many new communities grew on the outskirts of Toronto. These clamoured to be incorporated into the city but to no avail. The 1930s economic depression caused many suburbs in the area to be declared insolvent and their administration was taken over by the Province. This gave impetus to the idea of Metropolitan Toronto – a two tier system of government covering the whole area. The Toronto and Suburban Planning Board was set up in 1946 and its first Report in 1949 addressed both the need for adequate infrastructural services and their effective provision 'in an area divided into a number of separate autonomous municipalities'. Opposition was intense to any unification of Toronto's administration. In the mid 1950s, following the Cummings Enquiry in 1953, the Province of Ontario passed the Metropolitan Toronto Act. Under this, the new Municipality of Metropolitan Toronto was formed with powers to co-ordinate arterial roads, major sewage and water facilities, public transportation and regional planning. The boroughs retained police and fire services and public health. This has, in

9 Quoted in *Big Daddy* chapter 3: The Metropolitan Experiment, Toronto, Muir Press, 1980.

the last thirty years, enabled Toronto to become the major city of Canada with good and well maintained urban infrastructure. The test of its ability to overcome major political hindrances to infrastructure provision will be whether the need for an entirely new sewer system costing C$200m in 1968 will be recognised and acted upon; the key is the attitude to the boroughs who will have to bear a lot of the cost.

The issues facing Toronto are not unique but typify a Canadian approach to coping with urban infrastructural problems before they become critical.

Because Canada has only comparatively recently built its major inter-city surface infrastructure, the need for refurbishment is not nearly as acute as in the US and UK. Nevertheless, the aging of these facilities as well as of urban underground pipes will inevitably produce the need for renewal as in the case of Toronto's sewers. That this should not be based on a regime of 'crisis repairs' as is the case in much of the US and UK must be of considerable importance to Canadians. At the same time new communities and remote regions, some in areas which are subject to severe weather conditions, will require new facilities.

CHAPTER II

Some Infrastructure Inadequacies in the United Kingdom and the United States

To highlight the seriousness of the current problem, some key facilities which make up the economic infrastructure have been selected and their current condition in the United States and United Kingdom is described in this chapter. There is no disagreement with the assertion that a modern and efficient surface transport network is crucial to industrial growth and the maintenance of economic competitiveness. Yet the UK and the US each show some of the signs of inadequate and deteriorating surface transport systems.

Similarly it is true that a nation's underground water pipes also need to function effectively both for the supply of clean water and the removal of waste. The state of these facilities has been the subject of considerable public comment in the UK and US and the volume of evidence concerning the condition of existing piped systems contained in a number of official and private reports has led to considerable public concern.

While surface transport and piped water systems are the most frequently cited examples of economic infrastructure, they are by no means the only facilities which are necessary for an efficient modern economy. Among others which are considered significant are ports, airports, inland waterways and power generation. Some anxiety about the adequacy of these to meet future requirement have also been expressed. What follows is largely a summary of studies conducted by indigenous researchers first in the United Kingdom and then in the United States.

A. THE UNITED KINGDOM

1. Roads and Bridges

The national Motorway network of limited access highways in the UK is considered by experts to be deficient, both in terms of capacity and maintenance. Estimates of vehicle usage and road weights have been grossly underestimated by the planners and, as a result, there has been rapid and measurable deterioration in road surfaces. This is also true of urban routes.

Although Britain's need for a Motorway network has been conservatively assessed at some 2,000 route miles, only 1,660 miles have been constructed thus far. As a result, slow moving traffic clogs stretches of heavy usage, and bottlenecks are common where Motorways intersect with lower capacity two-way roads. As will be seen later in the chapter,

costs of transport to road users are, because of this, higher than necessary when wasted time and fuel are taken into consideration. Furthermore, this can only increase as road traffic density grows. The Department of Transport has estimated that between 1985 and 2000, assuming an average economic growth rate of 2%, road traffic will increase by 35% – far more than the existing and planned road network could accommodate[10].

Additional Motorway routes are needed not only to cope with increased capacity but also to provide sufficient access to junctions of economic importance such as cities and ports. For instance, London is still virtually the only major capital city among the industrialised countries without a completed outer ring motorway. Though the remaining stretches of such a motorway (M25), are expected to be completed in 1987, traffic patterns on portions already in use suggest that some stretches will need widening as soon as the ring is complete. Furthermore, although East Coast and Channel ports have become the main access to Britain's principal markets in Western Europe, accounting for 60% of trade, the existing Motorways trail off into secondary roads with lower capacity before they reach these points of departure. British exporters using ports are already burdened with the disadvantage of ferry charges; additional costs that are incurred because of inefficient internal transport systems will eventually be reflected in lost markets[11].

The slowness to construct new Motorways and trunk roads is made more serious by inadequate maintenance of older ones, and local government outlays for both current and capital expenditure on roads in real terms in 1983-84 were over 20% lower than those of a decade before[12]. The neglect of minimal requirements of renewal has meant that the existing network has suffered structural damage which has led to frequent lane closure. Intense use has also led to many stretches of Motorway reaching the end of their normal lifespan well ahead of schedule. On the assumption of a 20-year useful lifespan, some seventy miles (5%) of the network need repairing each year in addition to a backlog of some 63 miles accumulated from the 1970s. It will be well into the 1990s before this is finished.

The lack of replacement and under-design of *bridges* has only recently become a public issue due to the succession of bridge failures throughout the country; the enforced closure of the London Hammersmith Bridge over the Thames, west of central London in 1984, was a striking

10 *Policy for Roads in England, 1983*, cmnd. 1989, HMSO, London, 1983.

11 *The Fabric of the Nation*, Confederation of British Industry, London, 1984.

12 W. A. P. Manser, *The British Economic Base*, Federation of Civil Engineering Contractors, London, 1980.

example. Yet the problems are not new. Of the 155,000 bridges spanning Britain's road network, 79,000 are over 60 years old, and 69,000 are of the out-dated brick and masonry arch construction[13]. Even some of the more recently built bridges are structurally inadequate; for instance, the relatively new Severn Bridge connecting England with South Wales cannot now safely accommodate the loads it has been required to carry.

2. Railways and Other Public Transport

Like roads and bridges, railways and other mass transit systems (particularly urban subways) of the UK suffer from inadequate renewal. This inhibits their ability to provide economical and efficient service both for passengers and freight.

For the purpose of this paper, public transport infrastructure includes the stationary structures of a railway system including tracks, bridges, tunnels, rail stations, and signalling apparatus. The mobile elements such as locomotives and rolling stock are not included. Similarly, the standing structures of urban systems such as underground subway tracks and bus stations make up infrastructure; subway cars and city buses fall outside the definition.

The level of public sector involvement in the provision of transport varies from country to country. British Rail is operated entirely within the public sector, while railroads in the US and Canada are mainly owned and operated privately.

Though the degree of public sector involvement may vary, the dependence on government grants is uniformly quite strong. Nonetheless, the problem exists of insufficient capital investment in the permanent way, and is one of the causes of accelerated deterioration of some parts of the public transport system which also threatens the future operability of others.

The British Rail system is composed of a network of some 11,000 miles of track. Much of this and many of its bridges, tunnels and stations date from before the First World War. There have been signs of neglect and slowness to modernise. This seems to be due to a reluctance on the part of the Government to invest adequately. According to the Institution of Civil Engineers' Infrastructure Planning Group, the rate of investment has allowed little more than patchy renewals[14]. Consequently, the tracks are showing signs of permanent deterioration. At current levels of maintenance, by 1990 3,000 miles of track would be unusable in the opinion of the British Rail Board. Tasks which will require substantial investment in the near future include the replacement of softwood

13 *First Report of the Infrastructure Planning Group*, Institution of Civil Engineers, London, 1984.

14 *First Report*, op.cit.

sleepers laid in the 1950s and '60s, maintenance of bridges, viaducts, tunnels and other structures, and improvement of stations, many of which have been criticised as 'a deterrent to travellers'.

The London Underground System is also in need of significant capital investment. The majority of the network is more than 70 years old, and parts of this have been inadequately maintained. A report by the Greater London Council recently estimated that £1.3bn would have to be spent over 10 years in order to reach and maintain an acceptable standard[15].

3. Fresh Water Supply

Most of the UK's water supply network is over 40 years old and is suffering from the effects of continued neglect of preventative maintenance and proper renewal. As a result, many sections of the 160,000-mile mains water piping and the 150,000-mile service pipe network require cleaning, lining or patching to reach their normal service life. The frequency of bursts and the considerable loss through leakage, attest to the broken-down condition of these facilities. 88,000 bursts are repaired annually, and losses of clean water through the pipes are estimated at 24-30%[16]. Manchester, Britain's second largest city, had an average 21 bursts per day recorded in 1981.

Capital expenditure for water and sewerage provision in England and Wales has declined in real terms over the last decade falling from £983m in 1974-75 to £683m a decade later[17]. The Government's Public Expenditure White Paper 1979/80-1982/83 pointed out that the neglect of the water supply system will require a considerable increase in capital expenditure over the next decade. Some provision for this in the official capital expenditure forecast has been made with an estimate of £852m in cash terms in 1984/85, but this will only be sufficient to carry out 'first priority' projects[18]. In addition, health standards associated with the water supply system now necessitate greater investment in water treatment research and facilities especially in the light of the increase in intensive uses of fertilisers and disposal of toxic industrial wastes which drain into the water catchment areas from which fresh water is obtained. The research funding for this and other purposes is now £20 million per annum, less than one per cent of the total industry turnover[19].

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15 *London's Decaying Infrastructure*, GLC, London, 1984.

16 House of Lords Select Committee on Science & Technology *The Water Industry*, HMSO, London, 1982.

17 W. A. P. Manser, op.cit.

18 Civil Engineering Economic Development Committee memo, *'Investment in the Water Industry'*, July, 1985.

19 House of Lords, op.cit.

4. Waste Water (Sewerage)

Britain's sewerage system is in no better condition than its water supply. According to the National Water Council, seventy-five per cent of the 234,000 Km of publicly owned sewer pipes are over thirty five years old[20], while fifteen per cent of all pipes are a hundred years old or more[21]. No comprehensive sewerage map exists; some of these systems have been left without maintenance or repair indefinitely because they cannot even be located. Until the recent development of a remote-controlled closed circuit TV monitor, there was no means to inspect those sewers too small to be checked visually; their internal condition was unknown.

The deterioration resulting from age and neglect has become apparent in the widespread and frequent malfunction of Britain's sewers. Some 5,000 sewers fail every year, two thirds through potentially dangerous collapses[22].

Sewage treatment plants are another facility in need of improvement. Many plants positioned on or near rivers have been recommended to add a tertiary stage of treatment to ensure public health standards. Some areas lack modern sewage treatment facilities altogether, for instance both the Mersey and Humber rivers have untreated sewage discharged into their estuaries.

The condition of Britain's sewerage system overall requires increased expenditure on renewals if breakdowns are to be prevented and their accompanying health hazards are to be avoided. A House of Lords Select Committee on the Water Industry estimates that £310 million a year needs to be spent to maintain the system at its existing level of efficiency[23]. Annual investment in renewal, however, is now £165 million, a shortfall of at least 45% over that which is estimated to be required though new technology is improving the productivity of such funds that are spent on renovations.

5. Other Economic Infrastructure

The UK has lost *port* traffic to continental ports such as Amsterdam, Rotterdam and Bremerhaven largely as a result of inferior and outdated facilities, concomitant low productivity and high port charges. Handling delays and general over-capacity have also bedevilled the industry which is largely State owned.

As an example, in 1983 the British Steel Corporation assessed the cost of turning round a 25,000-tonne capacity vessel at Newport, South

20 The (UK) Water Research Centre Strategy Paper for House of Lords Select Committee, op.cit.

21 House of Lords, op.cit.

22 Ibid.

23 Ibid.

Wales, as over four times that at Rotterdam and three times that at Hamburg. (These Continental ports do not have to charge on a full cost basis, and also receive government assistance on capital development).

There are over 100 *airports* in the UK but the expansion of the three principal ones (Heathrow, Gatwick and Manchester) has generally failed to keep pace with growth of traffic. Heathrow Airport's scheduling committee has estimated that traffic volumes have reached the maximum with which London's premier airport can cope, while the use of the fourth Heathrow terminal is still some way off and plans for a fifth terminal are only tentative.

The proposed second terminal for Gatwick has similarly been delayed and the limited development of Stansted as the third London airport has only recently been agreed. Ironically, after receiving substantial investment, Scotland's poorly-sited Prestwick airport has an uncertain future.

Much of the 2,000 miles of UK *waterways* (300 miles of which are suitable for freight traffic) has fallen into decay. Stretches of waterway have become overgrown, silted up or have burst their banks. Some tunnels and bridges are now unsafe. In 1981, the British Waterways Board (BWB) assessed that the maintenance backlog totalled £100m.

Just five million tonnes of freight were carried by waterway in 1982, though the BWB says the system could handle ten times as much, and as cheaply as road or rail.

Power generation and distribution is another fundamental infrastructure requirement which is a necessary ingredient of any developed economy. Although private generation of electric power is allowed, the responsibility for the provision of this service in the United Kingdom lies with the Electricity Generating Boards together with the Supply Boards. As the provision of generating capacity is taking an increasingly long time from decision to production of power, and as controversy surrounds the type of fuel to be used, there is some prospect that capacity may become depleted at the start of the 21st century.

B. THE UNITED STATES

1. Roads and Bridges

In the US, as in Britain, highways and bridges are a major component of internal transportation and thereby play a significant role in the economic cohesion of the nation. Yet the US system suffers from deficiencies similar to those which affect the UK: the interstate highway system remains incomplete, the network is inadequately maintained, and numerous bridges are in urgent need of repair or reconstruction.

The interstate highway system, begun in 1956 and almost entirely federal funded, is planned to have a service life of 25 years. In 1980 the

Department of Transportation estimated that of the 40,000 miles completed, 8,000 were already beyond their service life and a further 4,000 required immediate resurfacing[24]. The interstate highways are of crucial importance as they account for over half of the total miles travelled by road in the US.

While the percentage of roadway classed in 'poor' condition was relatively low at the beginning of the decade, neglect of necessary renewal measures has decreased the mileage in 'good' condition substantially. According to a Department of Transportation estimate, failure to maintain and renew the network as it exists now will relegate 70-90% of US highways to 'poor' condition within 15 years[25]. An estimate by the Federal Highway Administration, cited by the Congressional Budget Office, of the US road conditions states that forty-one percent of the interstate highway system (17,000 miles) has reached or exceeded its original design life. Eight percent of the interstate mileage was rated in 'poor' condition in 1981, up from 3 percent in 1975. Furthermore, fifty percent of the mileage on the Primary, Secondary, and Urban components of the Federal Aid System is rated 'fair', while eleven percent is rated 'poor'.

Despite a budget increase of 16% for new construction and 7.5% for maintenance under the 1983 Surface Transportation Assistance Act, the Department of Commerce forecasts that road infrastructure will continue to decline unless some £12.8bn is spent annually on upgrading and repairs. Government regulations may well hasten the decline through more liberal provisions for heavy trucks which cause most of the road damage.

Bridges in the United States are in no better condition. 23.9% have been indentified as 'structurally deficient' and in need of major rehabilitation. Another 21.7% are 'functionally obsolete'[26]. Despite Federal instructions on regular inspection, the General Accounting Office has found that safety standards were still being widely disregarded. A recent Department of Transport estimate put the cost of replacement or rehabilitation of current deficiencies at $45.5bn. That compares with an average annual Federal allocation of $1.8bn currently including extra provision under the Surface Transportation Assistance Act[27].

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24 *Hard Choices*, a study for the Subcommittee on Economic Goals and Intergovernmental Policy, of the Joint Economic Committee of the US Congress, US Government Printing Office, Washington DC, 1984.

25 Pat Choate: *Bad Roads: the Hidden Costs of Neglect*, Corporate Press, Maryland, 1983.

26 Fifth Annual Report to Congress: Highway Bridge Replacement and Rehabilitation Program, Federal Highway Administration, USDT, Washington DC, 1984.

27 Federal Budget for Public Works, CBO Study, Washington DC, 1985.

2. Railways and Other Public Transport

The public transport system of the United States is faring little better; the railroads in particular are paying the price for deferred maintenance and delayed capital investment. According to the Associated General Contractors of America (AGC), the large number of track ties dating back from the 1930s and '40s are wearing out rapidly. Given current levels of track use and operating speeds, 50% of all ties will require replacement by 1988[28]. Even now reductions in operating speed are in effect for a growing mileage of track.

Significant improvement is not on the horizon for the railroads; the AGC have estimated the cost of all necessary improvements at $60bn over 10 years while current Federal expenditure total only $1.25bn annually[29].

The condition of America's urban public transport systems varies widely; like the railroads, a number have been insufficiently maintained and now face the burdens of capital replacement on a substantial scale. Physical deterioration is particularly severe in larger and older rail transit systems. Due to heavy usage and poor maintenance over a long period of time, the New York and Chicago systems absorb fully one-half of the annual expenditure for maintenance and restoration.

Expansion of existing rail facilities is becoming increasingly necessary to provide adequate public transportation to many cities. The Boston, Pittsburgh, and Philadelphia systems, for example, suffer the absence of linkage between downtown areas and the growing suburbs. If the present rail systems in major cities was to be extended, the Congressional Budget Office has estimated that it would cost $1.2bn each year between 1983-90 a year[30]. Other cities, particularly those which have expanded rapidly in the last decade, have no urban rail systems at all.

The general result of the deterioration in this public service is increasing traffic congestion and over-intensive use of the existing system, leading to breakdown and other diseconomies. It needs attention.

3. Fresh Water Supply

In the US, the water supply systems are plagued with many of the same problems as their British counterparts. Ageing pipework with its accompanying tendency to leak are prevalent features, causing a substantial clean water loss in many of the older cities. One survey of 50

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28 *America's Infrastructure*, op.cit.

29 Ibid.

30 *Public Works Infrastructure: Policy Considerations for the 1980s*, Congressional Budget Office, Washington DC, 1983.

US cities for the year 1980 showed a loss ranging from 39% in Boston to 6% in Denver. The mean for 'unaccounted water' for the sample was 14.7%[31]. It is clear that the deterioration of old supply systems is most frequent in urban areas; the Massachusetts Special Legislative Commission cited old water pipes as the 'single greatest need' of older cities and towns. Some of these aged systems can be salvaged temporarily through cleaning and lining, while others need immediate and total replacement.

Along with maintenance and renewal, the US water supply network requires additional facilities to accommodate a growing population and an expanding economy. Many storage and distribution systems are not sufficient to supply enough water in times of storage, let alone a natural increase in demand. Additional reservoirs are needed in areas with scant or cyclical water supply, while a better grid system is required to enable transfers to take place between areas. Further treatment facilities and/or new supply sites are also needed in those areas where groundwater has become unsafe through chemical contaminants.

The renewal and updating of the water supply network has been projected to cost $96bn (in 1982 dollars) before the year 2000. This sum breaks down to annual levels of investment which are significantly greater than recent annual capital expenditure on these facilities and substantially more than anticipated revenue[32]. This is not the only estimate (see Table 1 on page 26) but is similar to that contained in the Labour-Management Group Study[33].

4. Waste Water (Sewerage)

Many of the 15,000 sewer systems in the US are characterised by inefficient pipes and inadequate sewerage treatment. A good portion of the systems have been left in operation well beyond their designed service life. A new sewer, for instance, is set down with an expected sixty year life: many are now older than this[34]. However, age alone is not the cause of most failures; infrequent maintenance seems to be the main cause. In a survey conducted by the National League of Cities, nearly half of the local officials polled reported that their sewage and drainage facilities required, but were not receiving, major repair or rehabilitation[35].

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31 Cited by George E. Peterson in Testimony to the House Commitee on Public Works and Transportation hearings on the Federal Capital Investment Act of 1982.

32 *Hard Choices*, op.cit.

33 Labour-Management-Group, op.cit.

34 This is the basis used by John C. Musgrave in calculating net value of sewers in the Dept. of Commerce study of Government owned fixed capital in the United States in March 1980 issue of Survey of Current Business.

35 *Public Works Infrastructure*, op.cit.

The poor condition of the sewerage network is demonstrated through the frequent sewer failure. Cracked or loose-fitting pipes in around 16% of the treatment plants have caused the processing of about 25% more flow than necessary. As a result, there is an unnecessary additional cost in providing and servicing treatment capacity. It is usually more expensive to provide new capacity than repair defective pipes. The poor condition of sewers can also be seen from the fact that in communities in 34 of the 40 States with combined sewer/drainage systems, heavy rain often caused basement flooding and treatment plant overload, which can result in raw sewage being discharged into nearby rivers, lakes, and streams[36].

Between 1956 and 1982, the $29.9bn spent by the Environment Protection Agency (EPA) on all water treatment facilities has left the system in a somewhat precarious state. That agency has estimated that $119bn needs to be spent on renovation and expansion of waste water collection systems in the next 20 years if the system is not to deteriorate sharply; 74% of this will be on backlog needs[37].

5. Other Economic Infrastructure

The export trade of the US may also have suffered through inadequate *port* development. Only one port, for instance, has channels deep enough to accommodate deep-draught coal-carrying ships. (Even the exception, at Long Beach, California, is a substantial distance from most mining areas.) The National Waterways Study has recommended a $1.7bn development of three deep ports to aid coal – and also grain – exports.

Nationwide, public dock facilities will require a $3.7bn investment for necessary improvements in the next 20 years, according to an AGC report[38].

There are 780 commercial *airports* and 2,400 general aviation airports in the US, but the major American need in this sector is – like Britain's – expansion of capacity. The 1980-89 system plan of the Federal Aviation Administration identified needs of $12.7bn. Roughly two thirds of this is necessary to increase capacity either by improving existing airports (eg. extending runways to take larger planes, adding runways and gates) or by building new airports. To meet needs for all US airports until the end of the century, the National Transportation Policy Study Commission,

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36 Ibid.

37 US Environmental Protection Agency, *1982 Needs Survey*, Washington DC, 1982.

38 Association of General Contractors of America, op.cit.

assuming 'medium growth' in traffic, suggested a necessary investment of $60bn.

The most pressing deficiencies of the US *waterways* lies in lock facilities. The average age of the 184 principal locks is 40 years, while 56 locks are more than half a century old and/or technologically obsolete. The necessary repair and replacement bill is reckoned at around $15bn over the next 20 years. A general programme of waterways improvements in a study compiled by US Army Engineers in 1982 was costed at $32.5bn over 13 years. The same study forecast considerable growth in water-borne traffic should the improvements take place.

C. SOME CONSEQUENCES OF THE NEGLECT

Whichever aspect of the economic infrastructure in the US and UK is examined, there are clear indications that inadequate resources have been allocated either to their renewal and renovation or to their expansion to meet the requirements of their users both now and in the future.

Some examples cited in this chapter have immediate public impact, but it is the gradual (and often unseen) deterioration which goes unnoticed that in the longer term will cause the biggest problems unless steps are taken to remedy the situation. Little has been done to 'cost' the effects of inadequate attention to infrastructure but indications of the economic and social consequences of neglect can be gained from the evidence of a number of micro-economic studies.

Some kind of economic loss results from virtually every type of infrastructural deficiency. Some losses are relatively direct and to some extent quantifiable, while others are more indirect and intangible.

For example *in the United Kingdom,* road traffic congestion – whether caused by insufficient carriage width, surface or structural maintenance, repairs to underground sewers or water mains – delays the movement of goods and people. This leads to a direct cost in fuel, driver time and vehicle depreciation. The British Road Federation (BRF) recently monitored a section of the M5 Motorway for several months while it was under repair and estimated that the cost in delays and disruption for business vehicles was £46,000 a day more than the cost of repairs, an annual rate of £15m. Overall the BRF put the annual cost of traffic delays at £1.5bn[39].

The UK Government has estimated that the £2.1bn cost of planned road schemes due for completion in the four years 1983-87 will realise user and safety benefits of over £3.25bn, a return of over £1.50 per £1 spent.

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39 *Room to Move,* British Road Federation, London, 1984.

Some evidence to support this comes from a survey by the British Road Federation of major fleet operators who were asked to compare the cost of running lorries on Motorways and the most convenient parallel 'A' class road.

Ford Motor Company conducted one test on runs between its factories. On average, the cost of operating on 'A' roads was 54% higher than on Motorways. Despite the higher speeds attained on Motorways, fuel consumption was cut due to the absence of stop-start motoring. Ford were also able to eliminate the need for overnight stops by using Motorways, which saved on labour costs and which increased vehicle utilisation. Lucas Electrical produced similar savings in time and fuel consumption by using Motorways instead of 'A' roads. Their costs per vehicle were reduced by £4,500 per annum[40].

Because of road improvements Sainsbury, the retail grocers, estimate that in 1981 their Basingstoke distribution depot delivered 500,000 units a week using 153 vehicles. In 1985, it delivers 650,000 units a week using 130 vehicles. Vehicle costs were reduced by £400,000 annually and total savings were in the region of £1 million per annum[41].

Studies of the cost of neglect of infrastructure in the *United States* have tended to concentrate on the surface transport systems.

Poor roads clearly cause users to incur direct cost (damage and accidents) and indirect costs (delays, etc.). One US study by the Federal Highway Administration in 1982 found that operating costs on a road in poor condition may be between 15%-29% higher than the costs of using a good standard road[42].

A 1980 survey by the American Association of State Highways and Transportation Officials (ASSHTO) suggested that every mile of *bad road surfacing* could increase fuel consumption by as much as two thirds compared with good surfacing[43].

At the same time, indirect economic loss occurs from transport delays in the form of late deliveries, and their contribution to lost orders and ultimately lost markets. Such losses are, however, very difficult to calculate.

Infrastructural weaknesses that cause physical accidents also involve a cost in lost earnings, lost demand and potentially lost output. The ASSHTO survey attributed 21% of all *road accidents* in 1980 to bad roads, entailing a total cost of $8.5bn in hospital and other expenses, damage to property and lost production[44].

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40 *Challenge and Opportunity*, BRF, London, 1984.

41 Cited in *Financing the Future*, CBI, London, 1985.

42 Federal Highway Administration, Office of Highway Planning, *Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors*, Final Report, 1982.

43 Conserving Energy Through Improved Highways, ASSHTO, Washington DC, 1980.

44 For a full discussion of this see Pat Choate, *Bad Roads: the Hidden Costs of Neglect*, op.cit.

In her detailed report[45] of costs incurred because of poor infrastructure, Rita Bamberger of the Urban Institute cites a number of examples derived from different studies. Two suffice to illustrate the main point.

- According to estimates (prepared by Houston's Chamber of Commerce), time delays alone cost residents $750m in 1981 compared to a 'mere' $130m in 1969 and $440m in 1976 when growth was proceeding rapidly. When incremental fuel and insurance costs are added to the time delays, the total cost of congestion in Houston reaches $1.9bn in 1981.
- An estimate prepared by the Federal Reserve Bank of New York suggests that the aggregate cost in lost output due to train delays in 1980 for the one million New York city riders using the subway to commute to work is $166m annually, or $3.3m per week. This is based on an across-the-board time loss of five minutes per day (25 minutes per week) at an average wage rate of $8.00 per hour.

Deficiencies in US *water supply* have led to contamination in groundwater systems in some States. In 1980, 3% of all community water systems contained bacteria levels above the safety standard laid down by the Safe Water Drinking Act, and 11% failed turbidity standards.

The Environmental Protection Agency's Needs Survey found that 16% of the US *wastewater treatment* had significant infiltration and inflow problems amounting to about 25% of total flow. Communities were treating as much as one third more wastewater than they needed to because of cracked or loosely fitting sewer pipes.

Perhaps the largest loss resulting from infrastructural deficiency – though by definition hypothetical – is in *potential economic growth*. If, say, a major road or port modernisation programme were embarked on, local and regional spin-offs in economic activity via the construction industry alone could well be considerable. The UK Government accepts that better roads can remove restraints on industrial development, particularly where poor communications made it difficult to attract new firms to replace declining industries[46].

Failure to maintain or develop the infrastructure can have broader environmental and social effects which, while not necessarily involving direct short-term costs, can pose significant hindrances to the efficient functioning of the economy. For instance, in the UK, coastal pollution resulting from poorly-sited or insufficiently long sewage outfalls has become a troublesome health hazard as well as a disincentive to tourists.

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45 Rita Bamberger, *The Economic Costs of Infrastructure Deterioration*, Urban Institute, Washington DC, 1984.

46 *Policy for Roads in England, 1983*, op.cit.

Despite a 1975 EEC directive, raw sewage is still pumped out close to several popular bathing beaches. In the US, the Environmental Protection Agency has been encouraging a return to coastal discharge rather than full treatment – largely for short-term cost reasons, as in Britain.

To sum up: all evidence points to serious underspending by the governments, states, and counties on economic infrastructure. Estimates of the total expenditure required in different countries vary enormously: a recent US report[49] has summarised the estimated costs of national infrastructure needs in the United States as calculated by four recent studies of the subject. Table 1, which is an adaptation of one in that report, sets out the different estimates and the assumptions and definitions on which they are based. Although the time frame varies in each case, the overall impression is that a higher proportion of national resources needs to be devoted to refurbishment and extension of

Table 1
ESTIMATE OF EXPENDITURE NECESSARY TO REFURBISH U.S. ECONOMIC INFRASTRUCTURE
£bn (1982)

	AGC Study[1]	Hard Choices[2]	CBO[3]	Labor-Mgmt. Group[4]
Portable Water (Urban)	$138.6bn	$96bn	$11.2bn	$86.4bn
Wastewater Treatment	507.8	163	33.6	79.2
Locks	15.0	178	N/A	N/A
Ports	3.7		N/A	N/A
Waterways	32.5		29.6	N/A
Railroads	60.1		N/A	N/A
Mass Transit	37.2		N/A	N/A
Airports	60.1	N/A	13.6	N/A
Highways	1570.3	720	104.8	288.0
Bridges	51.7			
Time Frame	19 year avg.	thru 2000	thru 1990	thru 1995
Average $bn (1982) p.a.	130.4	82.5	27.5	38.8

1 America's Infrastructure – A Plan to Rebuild, the Associated General Contractors of America, May 1983.
2 National Infrastructure Advisory Committee Report to the Joint Economic Committee of Congress, February 1984.
3 Congressional Budget Office Report. Public Works Infrastructure: Policy Considerations for the 1980's, April 1983. (Federal share only).
4 Rebuilding America's Vital Public Facilities, The Labor-Management Group, October 1983. (1981$).
N/A = Not Addressed.

47 Association of General Contractors of America, *Infrastructure – The Aftermath and the Realisation: a Call for Action*, Washington, DC, 1985.

economic infrastructure if their condition is not to hinder the efficient working of the economy.

In the United Kingdom no overall study can be traced which estimates the costs of bringing up to standard and maintaining the economic infrastructure though the Institution of Civil Engineers has a project to do this. Individual sectors such as waste water provision have estimated a 45% shortfall in provision for renovations. The Director General of the National Economic Development Office (NEDO) in his memorandum to the July 1985 Council Meeting concludes:

> 'It is not possible to quantify the size of the total backlog of maintenance and repair work (on infrastructure). Nobody however, questions that it is substantial and cumulative in that it will cost more to remedy the longer it is left. There is an obvious need to develop programmes to reduce and contain the cumulative deterioration of the stock on a once-for-all basis over a period of years[48].'

It is clear, then, that the need to focus on the slow deterioration of the national infrastructure is well documented. Estimates differ on the costs of both renewing existing facilities and extending them. That something must be done soon is not in doubt, but two difficult questions remain: why is it that governments have not paid sufficient attention to the infrastructure? and, how could the necessary increases in expenditure be financed without rekindling the flame which so easily seems to develop into the fires of inflation?

48 Investment in the Public Sector Built Infrastructure: Issues for the Council, NEDC, London, July 1985.

CHAPTER III

Expenditure On Public Works

There has generally been a tacit duty on governments to provide a care for a nation's infrastructure. This is based on the concept that the community at large has looked to the Government for the satisfaction of its communal needs, and its citizens are prepared to pay taxes to see that these are met either directly or indirectly. The provision of defence is an obvious example but roads and pipe-borne services are among public works which are fundamental to a nation's economic well-being. The amount and kinds of centrally provided services expected from governments have grown rapidly epecially since the end of World War II and there is therefore considerable competition for tax and other revenue. Nevertheless, it is the task of government to ensure that the funds required for creation and maintenance of infrastructure assets are made available either from its own resources or from others. Governments have frequently stated that they recognise the desirability of new public infrastructure work, but that finance for this is not available owing to other exigences. As a result, much of the necessary infrastructure work has had to be postponed. The interpretation of such pronouncements must be that the finance for this has either not been recruited, or has been recruited and devoted to other purposes.

A. THE RECORD

What then is the record of public infrastructure investment and the provisions of funds for maintenance of existing facilities? For reasons which will be discussed later, governments are reluctant to distinguish between capital and current expenditure. Figures for public sector investment generally in recent years show a decline.

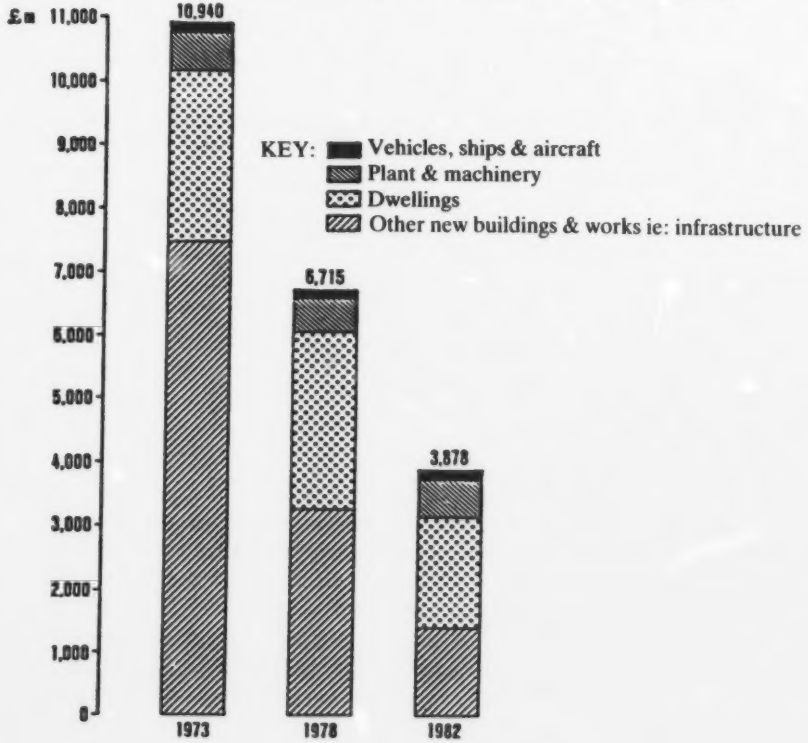
In the case of the *United Kingdom*, public sector investment as a whole fell, in real terms, by 19½% between 1972 and 1978, and again by more than 10% between 1978 and 1983 (see Chart II). Capital expenditure is set to decline further in the future. The 1985 White Paper outlining the Government's public expenditure plans to 1987/88 shows that overall capital spending – excluding defence – is planned to be cut by 24 per cent in real terms. Economic infrastructure spending is expected to remain relatively stable in this period. This was not, however, part of a general decline in national investment. Over the whole period between 1973 and 1984, private investment expenditure rose by more than 20% in real terms.

In the United States total public net investment fell from $23.6bn in 1967 to $7.0bn in 1977, both total in constant 1972 dollars – which shows

a drop in real terms over the decade of just over 70%[49]. Between 1978 and 1983, the figures for new public sector construction – a good proxy for infrastructure development – show that total outlays fell in real terms by 30%[50]. On the other hand, in the whole period 1965 to 1983, gross

Chart II

GENERAL GOVERNMENT (UK) GROSS DOMESTIC FIXED CAPITAL FORMATION (CONSTANT PRICES (1980))



Source: UK Income and Expenditure Accounts, 1984

49 US Department of Commerce, *A Study of Public Works Investments in the United States*, 1980, quoted by Pat Choate and Susan Walker in *America in Ruins* in 1981.

50 *Survey of Current Business*, current prices deflated by the CPI.

private domestic investment rose, in current prices form $112bn to $414bn; this, deflated to constant price terms, constituted a real growth of 22%. Chart III indicates the general trend of infrastructure captial expenditure at both Federal and State and local level in the period 1968-84 by types of expenditure. Table 2 tabulates the changes in stock values of selected US publicly owned highways, streets, sewer systems and water supply facilities. Although there has been an increase in apparent value when adjusted for inflation, the net value of these assets has hardly risen in recent years. While economic infrastructure spending appears not to have been as severely hit as other public investment, it does not compare well with the rates of increase of private domestic investment.

In Canada, net public sector investment reached a peak in 1975 of C$3,371 million but then fell steadily to reach C$2,635 million in 1979 – a reduction of some 22%. Since then it has returned in current C$ terms above its former level. But when inflation is taken into account, net fixed capital formation in the public sector in the decade since 1975 fell by nearly 50%, from C$2,215 million to C$1,445 million in 1985[57]. (See Chart IV). It should be noted however, that the definition of public sector fixed capital in Canada excludes investment in services of an infrastructure nature such as rail transport and water systems. These are termed government business enterprises and are included in private capital spending data.

The decline in investment by the public authorities in the three countries is of major dimensions. The question remains as to whether this loss was due to the diversion of available funds to other purposes, because it was deemed that the economic infrastructure services did not warrant the levels spent on them in earlier years.

The answer to the first part of the question is immediately apparent from the fact that between 1973 and 1983 total UK public expenditure as a whole did not fall at all[52]. In the United States, total government purchases of goods and services rose, in real terms, between the same two years, by over 15%[53] and in Canada total government expenditure also increased in real terms between 1973 and 1983 by 17%.

The governments in each of the countries concerned, therefore, do not appear to have failed to recruit funds for expenditure as such. Over at least the decade to 1983, they have spent no less, or have spent increasingly more. The reason why these outlays have not been spent on capital investment and on the infrastructure is that the direction of their

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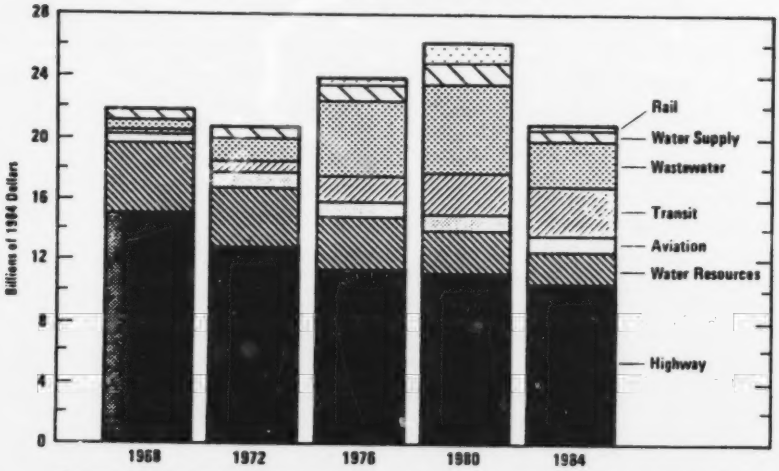
51 Statistics Canada, *Fixed Capital Flows and Stocks,* 1983 cat.

52 Central Government Current Expenditure plus Public Sector Gross Domestic Fixed Capital Formation: Blue Book 1983, tables 2.1 and 10.2, HMSO, London, 1983.

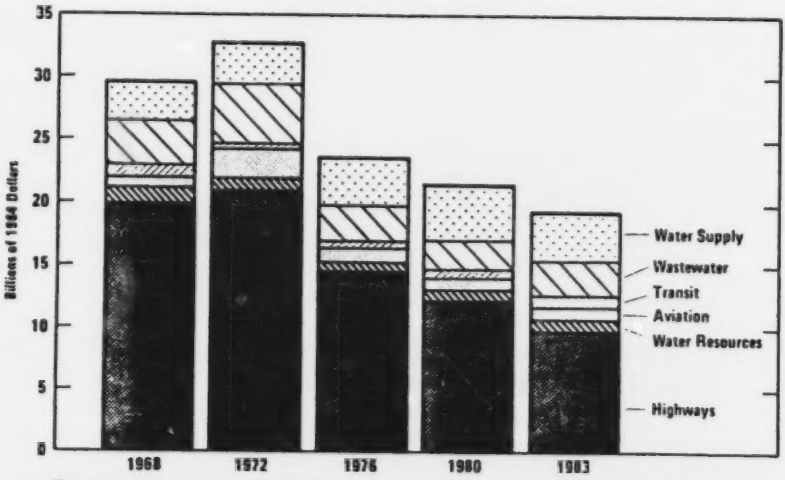
53 Economic Indicators: GNP in 1972 dollars.

Chart III
FEDERAL CAPITAL SPENDING FOR INFRASTRUCTURE BY AREA, FISCAL YEARS 1968-1984



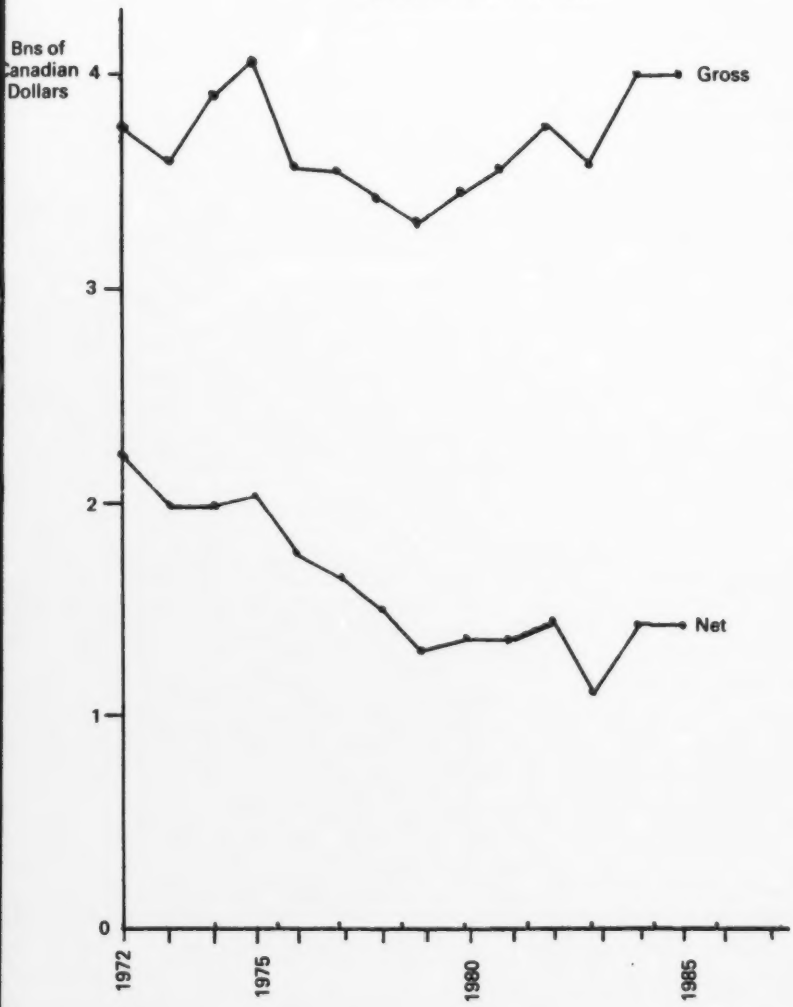
Source: Congressional Budget Office from data in *Budget of the United States Government.*

STATE AND LOCAL CAPITAL SPENDING FOR INFRASTRUCUTRE BY AREA, FISCAL YEARS 1968-1983



Source: Congressional Budget Office, from Department of Commerce, Bureau of the Census, *Annual Survey of Government Finances.*
Note: Excludes state and local spending for rail, for which data are not available.

Chart IV
PUBLIC SECTOR FIXED CAPITAL FORMATION IN CANADA
1972-85
(Millions of (1971) C$s)



Source: Statistics Canada, *Fixed Capital Flows & Stocks*. Ottawa. 1983, cat. 13-211.

expenditures has changed. Questions of where and why, will be considered later.

For the moment the conclusion remains that expenditure on infrastructure has not kept up with the growth of GNP and indeed it has tended to fall for a long period. There is little likelihood that a fall of such magnitude is justified by economic considerations. Indeed, in large and sophisticated economies where there is rising overall economic activity, both in size and complexity, it would call for enhanced infrastructure support both in renewals and new projects. Yet the physical sinews of the nations seem to be diminishing. The record remains therefore, that the public authorities in the United States and the United Kingdom particularly, do not appear to be discharging adequately one of the intrinsic duties to their communities; some of the results of this were described in Chapter II.

In trying to determine why public expenditure on renewal and provision of infrastructure has been inadequate, it is necessary to be clear how it is organised in the three countries which are the particular focus of this report.

Table 2
GROSS AND NET STOCK OF SELECTED US GOVERNMENT OWNED FIXED CAPITAL STRUCTURES 1970-83
(Billions fixed (1982) US $)

	Highways and Streets				Sewer Systems		Water Supply Facilities	
	Federal		State & Local		State & Local		State & Local	
	Gross	Net	Gross	Net	Gross	Net	Gross	Net
1970	$ 6.4bn	$ 4.6bn	$ 285.6bn	$ 191.9bn	$ 49.7bn	$ 33.0bn	$ 40.4bn	$ 25.7bn
1980	8.6	5.7	340.4	211.3	77.0	53.2	48.5	30.0
1981	8.9	5.9	343.1	210.7	79.2	54.5	49.4	30.5
1982	9.1	6.0	346.1	210.2	81.1	55.6	50.2	30.8
1983	9.3	6.1	349.6	210.2	82.9	565.2	50.6	30.8

Source: Survey of Current Business, various issues

B. ORGANISATION OF PUBLIC EXPENDITURE IN THE UNITED KINGDOM

1. The Spending Authorities

In the UK, the spending authorities are central government, local government, and the nationalised industries.

Central government is responsible for about three-quarters of total public expenditure, 40% of which is spent on goods and services ie:

defence, the national health service and education. The remainder consists of transfer payments such as social security benefits, housing subsidies and industrial support, plus net lending including loans to nationalised industries, as well as central government expenditure amounting to around 30% of all public capital investment.

Much of this spending is undertaken directly by central government departments, but some takes place through other bodies such as regional health or water authorities or 'quangos' (quasi-governmental organisations) such as the Arts Council or University Grants Committee which exercise considerable independence in the distribution of their central government grants.

Public capital investment in 1983-84 was 19% of all public spending, its proportion having declined fairly steadily over the last 20 years. Local authorities and nationalised industries are responsible for over 70% of public capital expenditure.

There are at present some 529 local authorities in Great Britain in a two-tier system of local government, with (broadly) the upper tier comprising county or regional councils with a lower tier of district and borough councils. As a whole, local authorities spend about a quarter of all public expenditure. Each tier has its own separate functions, which in the main include planning, public transport, police and fire services, education, public sector housing, waste collection and disposal and environmental health.

Local authorities spent £33bn in 1983-84, 53% of which was financed by central government, 34% by local taxes (rates) and 13% by trading charges. Some 10% of local authority spending was allocated for capital projects, compared with 64% for current expenditure. Capital borrowing by councils requires central government approval.

The main nationalised industries and public corporations include the National Coal Board, the British Gas Corporation, British Shipbuilders, British Rail, British Steel, the British Waterways Board, British Transport Docks Board, the British Airports Authority, the Electricity Generation Boards and the Electricity Council.

Direct lending to the nationalised industries from central government accounts for less than 1% of total public spending, but additional subsidies from central government are frequently required. Each corporation, however, has to obtain the approval of central government every year before implementing its capital investment plans.

2. Planning and Control of Public Expenditure

UK parliamentary supervision over central government spending remains negligible in practice, though some small reforms have been made in recent years.

The final spending estimates for each government department are presented to Parliament in the form of an annual Public Expenditure White Paper. While the budget (usually presented in March) in the form of the Finance Bill, is subject to lengthy parliamentary scrutiny and often modified, it had become the practice until the mid-1970s for the estimates to go through 'on the nod' with virtually no debate at all.

The Public Accounts Select Committee of the House of Commons scrutinises expenditure after it has taken place to determine whether a department has spent more money than Parliament granted, allocated it on authorised projects, or been guilty of waste or inefficient financial administration. However, these investigations are always 'post facto' and advisory in nature.

Government departments submit their spending plans (covering the next four years) to the Treasury every summer, some eight months before the next financial year. When they are combined, they usually total more than the Treasury's objective, so negotiations within Whitehall continue until provisional plans are published around the year-end, with the details finalised in time for the budget presentation to Parliament.

Until 1982 spending was forecast in volume terms eg: number of teachers employed, miles of motorway to be built with costs calculated according to 'survey prices' about 18 months before the financial year actually began. The system did little to encourage 'value for money' in use of resources. Now plans are made in strict cash terms, with an assumption about future inflation built in.

If a government department reaches its pre-set cash ceiling without fulfilling its policy objective, then it must either seek Treasury (and Parliamentary) approval for a supplementary estimate, or delay its extra spending until the following year. For the nationalised industries, external financing limits stipulate how much they can supplement their own resources from loans or grants from outside, in practice, mostly from the Government.

The system of tight Whitehall controls over local authority and nationalised industry capital spending tends to mean that whenever there is pressure to reduce public spending, capital projects (by their nature long-term) are the easiest targets to shelve or axe altogether. Government Ministers, who on average hold specific posts for less than three years, frequently prefer to avoid the short-term political difficulties involved in cutting current spending and instead choose to leave the problems of capital replacement to their successors. It has been rightly observed that sewers have no votes!

Central government's powers over local government in the UK have expanded considerably since 1979 and are currently being developed further.

Whitehall now sets an annual expenditure target for each council based on its past spending record, inflation and government policy. A council that overspends this target loses some of its block grant from central government. The penalties increase according to the size of the overspend.

However, the Government's grant-penalty system has proved ineffective in curtailing general local authority expenditure as many councils simply went ahead with their own programmes and imposed a sufficiently high rate levy on local ratepayers to compensate for the loss of central government grant. This in turn prompted the Government to seek further powers to limit (or 'cap') the amount by which a council can increase its rates. Ministers are now confident that in 1985-86, a firm grip will at last be established on 'town hall' spending.

The accountability factor is made even worse by the fact that the bulk of the rates (55%) is paid by local businesses, who have no vote at all. It is understandable, therefore, that despite the rate rises, the detail of spending plans seems to be a matter of high indifference to the general public.

C. ORGANISATION OF PUBLIC EXPENDITURE IN THE UNITED STATES

1. The Spending Authorities

In the United States, the spending authorities are the three tiers of government: Federal, State and Local.

Federal government's broad categories of spending are for defence, and 'social security' as well as what might be termed 'economic development'. Most expenditure takes place directly through central government departments or the hundred or so Federal agencies.

The States' major responsibilities are education and transportation (mostly highways other than interstate highways). About a quarter of State government's income consists of Federal government grants. There are also nine multi-state regional development organisations.

Local city and county government's prime spending functions are education, police and fire services, and health. Grants from State and Federal authorities make up around 40% of local government income.

Overall, the Federal share in public spending (including defence but excluding inter-governmental transactions) is around 55%, with the State share about 20% and local government accounting for 25%. The Federal government funds more than 50% of State and local public works. The system of decentralised responsibility (albeit with a substantial proportion of central government funds) is well established.

2. Planning and Control of Public Expenditure

In the US, Congressional participation in the Federal budget system is much stronger and more far-reaching than in the United Kingdom.

Each January Congress receives the President's recommended spending levels (and expected revenues) for the coming fiscal year, which begins in October. Congress – which is much less subject to party disciplines than the UK or Canadian Parliaments – then appraises the proposals department by department and is free to change them.

The budget committees in both the House and the Senate follow a common schedule, beginning with the preparation of a concurrent resolution by mid-April. This resolution projects revenues and sets appropriate levels of spending in the form of specific targets for various government functions. Any differences between the two houses must in theory be settled by mid-May and the eventual agreed resolution may block consideration of any bills that cause spending in excess of targets. Binding appropriations are then drawn up by the authorising committees. However, this does not prevent Congress approving subsequent waivers to authorise more spending or accede to an urgent 'supplemental request' from the President.

After all the appropriate bills have been passed, the President has a limited time to sign or veto them. Congress can of course override vetos with a two-thirds majority. In recent Congresses, the setting of the budget has become protracted with the necessity of 'continuing resolutions' having to be passed in order to meet the wages bill for Federal employees.

As in the UK, there has until very recently, been no provision for a specific capital budget; broadly similar budget procedures are followed at State and local levels.

Shortly after the President's budget proposals have first been submitted to Congress, the Office of Management and Budget (OMB) asks each government department and agency to present its budget for the following year, including requirements under existing programmes as well as recommended programme changes.

After a preliminary consideration of these plans by the OMB and the President, the OMB conducts Hearings at which the various departments and agencies have to defend their proposals. A revised Budget plan is then drawn up for the President, who resolves any inter-departmental conflicts.

Budget planning in the United States is thus an almost continuous process and the entire spending programme cannot be assessed anew each year: Expenditure from any one year stems largely from programmes legislated by Congress in previous years. Major shifts in budgeting policy are therefore difficult to achieve though recent experiments in less incremental approaches have been tried.

Nevertheless, because most expenditures are made in line with past statutes, many outlays are not in practice controllable on a year-to-year basis. The 1980 budget, for instance listed outlays of $397bn as 'relatively uncontrollable', with only $135bn rated as 'relatively controllable'. Of the former, $316bn reflected fixed costs and outlays under open-ended programmes.

In the US the greater political scope for modification of budget programmes leaves them more open to influence by the public. In practice, however, this tendency may only enhance political pressures against capital and in favour of current spending projects. The past two decades have seen a marked increase in the number of special interest groups (some federally financed) that are skilled in political lobbying at all levels. These have played their part in shifting emphasis to social and other programmes at the expense of public works.

The Federal government funds more than half of all public investment carried out at State and local level. Most of these grants-in-aid are for specific projects mandated by central government. But recently there has been some increase in the proportion (now about 25%) of Federal Grants that are either block grants or revenue-sharing, which allow greater State and local flexibility.

However, the division of responsibilities between the various levels of government has become rather blurred, with voters often left perplexed as to which authority actually finances or looks after, for example, the construction, maintenance and operation of a particular dam or sewerage system. Inefficiency can and does result.

D. ORGANISATION OF PUBLIC EXPENDITURE IN CANADA

1. The Spending Authorities

Spending authority in Canada lies with the three levels of government, often with considerable overlap in areas of spending activity: Federal, Provincial and Local.

The Federal government's main spending jurisdictions are national defence, social services (primarily pensions and Old Age Security), and regional and industrial development. While these are some of the main spending areas, the Federal government undertakes expenditure in other areas through general or special purpose transfers to the lower levels of government. Such transfers can account for 15-20% of federal expenditures and a similar share of total provincial revenues.

The provinces have constitutional authority in the areas of health and education, which, with social welfare expenditures, make up about 60% of provincial expenditures. The provinces are also involved in substantial transfer payments to local governments so that, for example,

more than half of provincial spending on education is made through local boards.

While some areas of spending authority are clearly defined, this is not universally the case. Many functional areas of expenditure are covered by all three levels of government, though with some degree of specialization. For example, transportation expenditures are made by all levels of government, with air, water and rail handled primarily at the federal level, highways by the provinces, and city streets and public transit by the municipalities.

2. Planning and Control of Public Expenditure

In Canada, the Main Estimates of federal expenditure are presented to Parliament each February by the President of the Treasury Board. The Estimates are referred to committees of the House of Commons. Once the Committees have reported on their deliberations, approval is normally a straightforward process and is often completed before the beginning of the fiscal year on April 1st.

The Estimates are developed through a process that merges multi-year programme forecasts prepared by individual government departments with an overall fiscal framework. The framework is prepared by the Department of Finance and the Treasury Board Secretariat and approved by Cabinet prior to the Federal budget. In 1979, the government implemented the Policy and Expenditures Management System (PEMS), also known as the 'envelope' system, to improve expenditure management and control[55]. Under the envelope system federal expenditure is broken down into major functional categories such as defence, economic development and social affairs. While the envelope system has helped clarify government spending options during the recent period of fiscal restraint, it does not explicitly separate capital expenditures from spending on current operations.

As in the United States, expenditure planning is a continuous process. Statutory programmes legislated in earlier years account for approximately two-thirds of federal spending.

New spending initiatives and/or major efforts to restrain spending are normally implemented as part of the Federal budget.

Under the present system, a budget can be 'brought down' at any time during the year that the Cabinet feels it is wanted. In recent years there has been some dissatisfaction with the lack of a regular budgetary cycle in Canada.

In May 1985, the government proposed that an annual budget be

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55 The envelope system was recommended by a Federal Royal Commission. See Royal Commission on Financial Management and Accountability, Final Report, Supply and Services, Ottawa, 1979.

tabled in late January or early February each year[56]. The proposal was designed to facilitate pre-budget consultation and reduce the uncertainty of provincial governments and groups in the private sector caused by the unpredictable timing of Federal budgets.

The expenditure process in the ten provincial legislatures is similar to that in Ottawa. Spending estimates are prepared on a regular annual cycle while budget timing varies at the discretion of the governing party.

In recent years, capital spending in the provincial, local and hospital sectors has accounted for over 80 percent of total public sector capital spending in Canada. Because local governments and hospitals are heavily dependent on transfer payments from the provincial treasuries, provincial governments are the key decision making units in determining the level of public sector capital spending in the non-Federal government sector.

To sum up: although the size of government expediture in real terms has risen in all three countries, public sector capital exenditure generally has fallen. The pressures to increase day-to-day current expenditure have been such that, even though funds are available, their disposition has resulted in economic infrastructure being given too low a priority in the United Kingdom and the United States especially in regard to renovation and renewal. Canada seems so far to have avoided this.

The organisation of public finance at national and local levels in the three countries is complex and therefore diffcult to change. If there is to be adequate provision for economic infrastructure renewal and enhancement, then perhaps the public expenditure systems as a whole need examination and revision to take this need into account. This is especially so in view of the fact that much of the responsibility for providing those services is delegated from central government to lower tiers of government in the three countries.

56 The Honourable Michael H. Wilson, Minister of Finance, *The Canadian Budgetary Process: Proposals for Improvement,* Department of Finance, Ottawa, 1985.

CHAPTER IV

Defects in the Present System

A. RECRUITMENT OF FUNDS

Public authorities rely in the first place on tax revenues for the financing of their expenditure budgets. This is rarely sufficient, so they borrow. This borrowing requirement has been generally growing as a proportion of total public sector resources and is leading to a problem common to the UK, the US and Canada: current tax revenues or trading returns increasingly cover only current expenditure. In an earlier period, current revenues first covered current expenditures and then were used to provide as far as possible for capital outlays, the balance 'below the line' being left for funded borrowing. This convention has largely passed away. The system of raising the sums, known in the UK as the Public Sector Borrowing Requirement (PSBR), does not indicate its purpose, merely the rate of interest and redemption date.

On the other hand the US system of bond issues gives some recognition to the purpose of fund raising; it is used for a variety of public sector projects, distinguished both by area of government, either Federal or State, and by type of issuing institution, ie: utilities, public transport and public authorities generally.

Borrowing by government sector and by specific authorities is also common in Canada, although the central government appears to take the lion's share. In the UK this disaggregation of borrowing was also common until some two decades ago. However, a number of factors conspired to render it inoperative, the principal one being that certain public institutions fell into financial difficulty and were unable to honour their debt redemption. Since their borrowing had been made under central government guarantee, the UK Treasury was called upon to make good these losses. By the mid 1970s, under pressure from the mounting deficit position of the public sector, the Treasury and the Bank of England had become proficient in the sale of central government debt, being able to sell large issues virtually at will and at yields frequently seen to be more favourable than those conceded by other public sector issues. Except for a few instances where, for balance of payments reasons, other issuers were encouraged to borrow abroad, the practice soon become invariably that all public borrowers should finance themselves from the National Loans Fund; the fund was itself financed by the Treasury and the Bank of England through the sale of 'gilt-edged' stock to the market.

However, in both the UK and the US, increasing issues of central government debt caused by expanding deficits led to ever greater stress in the capital market, pre-empting the volume of savings which in turn cause an undesirable rise in yields (see Table 3). Whilst in the UK the

authorities seem for a time at least, to have checked this tendency, the same has not been the case either in US Federal deficit funding or in Canadian borrowing requirements.

Table 3
GENERAL GOVERNMENT FINANCIAL DEFICIT AS A PERCENTAGE OF GROSS PRIVATE SAVINGS

	1973	1975	1979	1981	1982	1983*	1984*
US	–3.4%	22.6	–3.5	5.3	22.2	22.2	21.1
UK	14.1%	28.8	16.4	15.3	11.9	17.6	14.7
Canada	5.3%	12.5	8.3	5.8	26.4	27.0	23.3

* estimates and forecasts

Source: OECD Working Paper No.14, *The Conduct of Monetary Policy in the Current Recovery*, OECD, Paris, 1984.

B. PRIVATE FINANCE FOR PUBLIC PROJECTS?

In the face of these problems there has been a call for increased 'private' financing of public sector projects. It is clear from the foregoing that all public sector expenditure is ultimately financed by the private sector. However, that phrase generally has the more specific meaning that a distinct and detachable section of a public sector activity should be put out to direct funding in the market. It has a major disadvantage: in the absence of a central government guarantee, the issue may attract insufficient buyers. The existence of a guarantee, however places a contingent liability on the central government which in turn forces up the likelihood of yet more borrowing with its consequent effect on rates of interest.

One way out of these diffculties lies in the recourse to the use of private funds, a solution more suited in the relatively more contralised economy of the UK than in the US or Canada. Some considerable sales of assets are taking place in the UK though not so far in the realm of economic infrastructure. The Federal Government in the US is anxious to transfer Conrail to the private sector. What sales are made will have the effect of reducing the calls on the public purse for capital for those particular industries. But until such time as particular assets have been transferred from the public to the private domain, it remains the responsibility of the public authorities to maintain them in good order, and where necessary to extend them.

If a way of doing this using privately owned funds can be devised ie: a building and lease back system for a trunk road or bridge, then it clearly needs to be carefully considered as an option.

C. DEPLOYMENT OF FUNDS

1. A Capital Budget

Public expenditure is planned in terms of departmental spending on specific functions. However, an economic classification is needed in order to examine its effects on the economy as a whole. At present this can only be done in retrospect.

Since governments and others find it is necessary to know into what economic category past expenditure has fallen, then it must also be necessary to know, and to decide, into what category future expenditure should fall. Corporate boards naturally consider on a regular basis the future development aims of the enterprise, and estimate what capital expenditure in pursuit of these aims will be necessary, plan the generation of these capital expenditure requirements, allot them systematically to budgets, and monitor the proper emergence and use of those funds as one budget succeeds another. What is correct and normal for corporate enterprises in this context is also applicable to Governments.

The provision of a capital budget for renovation, renewal and extensions of the physical infrastructure on which economic activities depend is considered by many to be crucial. The point has been fruitfully investigated recently by a number of bodies in the US and the UK who have come to similar conclusions. For instance, the Committee on Public Works and Transportation of the House of Representatives put forward a fully considered and detailed review of this in 1983[57]. It should be noted that the Canadian budget process is a good deal more oriented to economic sector disagregation and many benefits accrue from this as far as capital budgeting is concerned[58]. In the UK, many comments on successive Public Expenditure White Papers have been made by the House of Commons Select Committee on the Treasury and Civil Service on the need to distinguish capital and current expenditure. In 1983, for instance, it recommended: 'We continue to believe that the overall balance between expenditure on current consumption and investment – which provides benefits for the future – is wrong[59].'

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57 *Capital Budgeting*, Report of the Committee on Public Works & Transportation of the US House of Representatives, Washington DC, 1983.

58 For a discussion of the Canadian position, see D. A. L. Auld, *Budget Reform: Should There be a Capital Budget for the Public Sector?* C. D. Howe Institute, Toronto, 1985.

59 Report of the House of Commons Select Committee on the Treasury and Civil Service, *The 1982 Budget*, HMSO, London.

2. The Attractions of Current Spending

Reasons why central budgeting in the UK, the US and Canada has not responded (at least until recently) to the need for disagregation of current to capital expenditure derives from the financial pressures, the social requirements and the need to satisfy public opinion which is a consequence of the political systems of these countries.

Intrinsically, the electorate prefer consumption to saving. Expenditure on additional Town Hall or State Government employment (and therefore pay) seems popular. They equate expenditure on staff activity in medical services or in the educational or social services system and on the various Federal services, autonomous bodies and commissions as an increase in the service rendered. Larger numbers of environmental inspectors and officials, more spending on school books and buses, on subsidies, more tax relief for borrowing including housebuying or pensions purchases, are all considered by the electorate as good in themselves, and a proper product of Government.

To acquire these services the electorate will tolerate a degree of taxation but it will be far less tolerant of a levy which is stated to be for a long-term project the fruits of which may materialise at some time in the future. Moreover, there is a limit to the level of taxation either direct or indirect which the electorate will tolerate for the financing of consumption, and this level will frequently fall below that of the expenditure itself. Finally, the electorate is slow to recognise the advantages of the capital asset when it is eventually provided out of a shrinking purse by the public spending authorities: A new or repaired bridge or sewer pipe is generally recognised as useful and is welcomed, but the individual tax-payer is neither able nor disposed to relate the personal advantages he derives from it to the level of taxes he is himself paying.

3. Political and Official Pressures

These social factors reverberate through the political and public finacial system. All members of Government, central and local, are under constant pressure for increased consumption spending and are well aware that their electoral popularity rests with their ability to gratify this and is jeopardised by an insistence on their part that consumption items should not be granted and that public money should be devoted to investment. The modern history of public finance is one of almost exponential current expenditure growth. There are many occasions on which political favour has been consciously obtained through acts of

current spending. In a few cases both in the UK and the US the disposition to acquire popularity through expenditure has gone beyond the bounds of public morality; and individual political office has been sought by promises of specific public spending.

Once set in place a political spending machine of whatever character is then administered by officials. It will be the instinct of the latter to maintain the machine on its prescribed course rather than to seek criticism, reform and changes which will to them be disruptive causes of disorders and indecision, adding unnecessarily to their workload. A consumption-oriented spending bureaucracy will therefore tend to settle lower and lower into its accustomed groove.

To this instinctive attitude is added the inconsistency of political control. As in a democracy, one party with declared social aims succeeds another, the direction of the spending machine is successively shaken with policy shocks. The reaction of senior public servants is to question carefully any policy change, and they tend to resist suggestions for a distinction between current and capital spending.

The effect of pressures of these kinds on UK public sector spending as a whole has been discussed by, among others, Professor Alan Budd of the London Business School[60].

Professor Budd has shown that throughout a sample period 1976/77 to 1982/83 spending on public capital projects in the UK fell continuously, whereas consumption rose continously. He also demonstrated that within the falling total, there was a continuous shortfall in the completion of capital expenditure plans that had been announced. At the same time he shows that there was an overshoot on the expenditure plans for the provision of current services and he endorses the conclusion of the House of Commons Treasury and Civil Service Committee that 'more attention should be paid by the Treasury to practical management of capital projects' and that the balance between expenditure on current consumption and investment is wrong.

To sum up: The bias in the system of public finance as it has evolved in the UK, the US and Canada militates against a rational approach to economic infrastructure renewal and expansion. While sector by sector plans for its renovation, replacement and development are generally well thought out and agreed, it is the provision of the resources to carry out the programmes that is at issue. Some more responsive system such as capital budgeting, which would see infrastructure as depreciating public assets unless adequate funds are budgeted year by year and spent on their refurbishment, seems to be required. To achieve this objective,

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60 Alan Budd, *Capital Underspending in the Public Sector*, The Federation of Civil Engineering Contractors, London, 1982.

some central organisation to focus on the condition and need for public works might also be helpful. Suggestions in the UK for an Infrastructure Strategy Board[61] or in the US for a National Infrastructure Fund[62] seem to be promising approaches. Because the delivery of much of the public economic services is necessarily local, Regional or State organisations with similar functions would also be useful to complement any Federal or National body.

61 *First Report*, op.cit.

62 *Hard Choices*, op.cit.

CHAPTER V

Some Conclusions and a Recommendation

The growing public concern, particularly in the UK and US, about the adequacy of the economic infrastructure and the day-to-day experience of its users has served to focus attention on this topic in recent years. That the economic infrastructure of the UK, US and Canada is in need of constant repair, refurbishment and extension there can be no doubt. In the UK and US in particular, there does seem to have been increasing neglect over several decades. It has taken the form of inadequate provisions for the maintenance and repair of existing facilities and an uncoordinated approach to the provision of new facilities by public sector authorities. This, in some cases, has led to over provision of some services and under provision of others.

Indeed, an examination of public accounts in the UK, US and Canada shows that, as far as can be discerned, capital expenditure on economic infrastructure has been steadily falling in real terms and also as a proportion of total expenditure in these three countries.

The problem is compounded, first by the lack of distinction in public accounts between current and capital expenditure for the provision of these services, and second by there being apparently no budgeting for the systematic renewal of publicly owned assets in most of the sectors under consideration. As a result, an inadequate system, inadequately funded, of renewal and renovation has grown up; an increasing proportion of the resources which is made available are being used to cope with crises, such as sewer collapses, burst water mains, bridge faults and the break up of road surfaces rather than on renewals and the provision of new facilities.

Thus, it is urgent to re-examine the method which determines how public funds are dispensed so that infrastructure needs are given the priority that is required to ensure proper maintenance and provide for extending the systems.

Little in the way of an overall assessment of a nation's present and future capital needs on a long term basis is being attempted. At present, the maintenance and expansion of economic infrastructure compete for resources with other seekers for funding at national or local level. Each sector submits its assessment of its own requirements; within this, some type of cost/benefit analysis is becoming mandatory and this will, to some extent, offset the constant pressures from particular interest or political groups for special treatment. But on a wider scale, an objective assessment of the relative urgency of say, an airport or a trunk sewer compared to a fixed link across a wide stretch of water needs to become a normal occurrence.

The comparative urgency of economic infrastructure requirements

with say, the financial demands of job creation and training initiatives, ie: capital v. consumption expenditure, also needs to be carefully considered. This is not to suggest that politics should play no part in decision making on these issues, but rather that some means is needed to keep under overall review both continuing and new infrastructure requirments. This, together with a system of public sector capital budgeting and a requirement to set aside adequate sums to pay for systematic renewal would help to redress the apparent imbalance in public expenditure both between capital and consumption expenditures and between the capital requirement of different sectors.

Responses in the Three Countries

A number of responsible organisations in the UK and US in particular, have been concerned about these issues and have made a variety of proposals. The public debate has also been reflected in discussions in the Parliaments and Congress.

In the United Kingdom, the Ministerial Statements regarding the need for more public spending on infrastructure projects have been very cautious. The main thrust has been that the overriding priority must be to keep public expenditure under control at all costs. If not, it is agrued, it will stimulate inflation and centralised decision making to the detriment of the private sector and ultimately the freedom of the individual. Ministers have argued this consistently but also pointed to the fact that demands for current expenditures – notably welfare payments and public sector salaries – leave little room for expanding the capital expenditure programmes which are claimed to be substantial[63]. Planned capital spending in 1985/86 by central and local government is, at £13.5 billion, little changed from the estimated outturn in 1984/85. It is expected to rise to over £14 billion in 1987/88, implying a small reduction in real terms over the period. In certain sectors there are signs of flexibility. For instance, the House of Lords Select Committee on Science and Technology's report on the Water Industry[64] received a positive response from the Government when it recommended a more systematic approach to the provision of fresh water and renovation of the sewerage system and the Chancellor of the Exchequer, responding to the National Economic Development Council in June 1985, also acknowledged the need to pay more attention to infrastructure requirements.

The basic arguments deployed by the protagonists for a realistic approach to economic infrastructure are having some effect. It seems

63 For a detailed look at UK Government responses to the debate, see W. A. P. Manser, *The British Economic Base* 1985 (Chapter X), FCEC, London, 1985

64 House of Lords, op.cit.

of expenditure allocations towards better infrastructure maintenance and provision will be politically costly, there is evidence that policymakers are coming to realise that, ultimately, the cost of inaction in the UK is even higher.

In the United States, considerable legislation was proposed on economic infrastructure in the 98th Congress (1983/84). With one major exception, this lapsed at the end of 1984. The exception was a Bill – now PL98/501. Known as *The Public Works Improvement Act of 1984*, it could have an important effect in bringing coherence to Federal policy on infrastructure provision as it establishes a National Council on Public Works Improvement. This is set up for three years to develop a comprehensive overview – Federal, State and Local – of the infrastructure issue, including an assessment of need, resources and institutional constraints hindering appropriate infrastructure development. Further, the Act provides for a Federal Capital Investment Program Report beginning in Fiscal Year 1986.

Apart from Congressional legislative activity, the public concern generated in the US by the publicity on deteriorating infrastructure has had some impact on national and local administration responsible for different sectors of infrastructure provision.

In New York State for instance, where problems have received considerable attention in the media, a State five year capital plan has been approved by the legislature establishing priorities for infrastructure rebuilding. The programme costs $20 billion and has a strong emphasis on repair and provides for a State run Bank to finance reconstruction of municipal water and sewage facilities. Many other States have initiated Infrastructure Task Forces, Commissions, Departments or Advisory Committees to report to their Governors.

Highway funding in particular, has been increased in the last few years. The average motor fuel tax rate is 11.6 cents per gallon which is an increase of 16% in three years. This is over and above the five cent Federal motor fuel tax increase of 1983 which is also used for expenditure on highways.

Local financing of public works projects via municipal tax-free bonds has been recognised as crucial in refurbishing local infrastructure especially as pressure to reduce the Federal budget deficit increase and tax income becomes more difficult to generate. As a foretaste of this, Congress stipulated in the summer of 1985 that any Federal funding of water projects (hitherto largely paid for with Federal grants), must be matched by a much higher proportion of funds from cities or States than heretofore.

In Canada, economic infrastructure does not yet appear to have become an issue of public concern. Governments at both federal and provincial level have realised that the provision of economic

infrastructure is an essential element in the development of the nation. As a result, Canada's roads, bridges and mass transit systems are of a high quality, and urban infrastructure provision in cities like Toronto have benefited from the decisions earlier this century which resulted in centralised authorities being given twenty year planning horizons. Recent examples of concern about infrastructure include the allocation of funds for a programme upgrading the transcontinental railway system in the West of Canada, which is important in moving farm products and minerals to West coast ports and a C$2.4 billion programme of public capital spending – the Special Recovery Capital Projects. This was provided in the April 1983 budget for the improvement to roads, airports, water and sewage systems as well as major port refurbishment. The number of economically worthwhile projects fell short of the funds available – a sign that Canada's infrastructure does not yet suffer from decay due to excess use or inadequate standards.

The Recommendation – A Standing Commission

A specific recommendation flows from the considerations discussed in this paper. Variations of it have been set out in one form or another in numerous studies and commentaries on the state of economic infrastructure in the United Kingdom and the United States. It is applicable equally to Canada and any developed economy where public expenditure tends to be determined more by short term expediency than long term needs.

The recommendation is to delegate to a high level, permanent and independent body in each country the responsibility for assessing and reporting on the current effectiveness and future requirements of the nation's economic infrastructure. It would report annually to the nation about its economic infrastructure. Such a body – which might take the form of a Standing Commission on Economic Infrastructure – would have a small number of commissioners and a professional staff. While a national body would be necessary because of the high proportion of the funding for infrastructure projects which comes from central government resources, in the United States, and possibly in the United Kingdom and Canada, it would need to be replicated at regional level.

The proposed body in each country would be given three principal functions:

1 *To make a comprehensive assessment* of the present state of existing economic infrastructure within its national boundaries. This would include information on its quantity (stock), quality, current value and current adequacy. Much information already exists but there would need to be improved methods of both data collection and assessment. Following the initial inventory, the Commission would keep this up to date.

2 *To set objective standards* for upgrading existing stock and for providing new facilities. This would include methods for assessing life cycle costs and systems of planned maintenance and renewal based on realistic depreciation rates.

3 *To develop an effective system of financing* infrastructure maintenance, renewal and provision of needed new facilities. At present the method of financing these activities varies in the three countries discussed in this paper. There seems to be general agreement that the present systems rely too much on central government funding and thus are competing not only with continuous demand for, (and political attractions of), increases in consumption expenditure and the provision of social infrastructure but also with effective pressure groups which tend to exaggerate the importance of one project over against another.

For new projects one type of financing which has already been used successfully is revenue bonds, floated in the capital markets for specific sectors and regions, and eventually extinguished by user or other fees. This avoids the much criticised one year funding cycle which governs current thinking in official circles[65].

In the US, proposals for a National Infrastructure Fund to administer this were included in 1984 proposals recommended by the Joint Economic Committee of the Congress in its Report on infrastructure needs entitled *Hard Choices*[66].

Some of the major benefits that the proposed Commission would provide stem from its ability to:

- Take an overall view of the nation's present and future needs;
- Initiate innovative funding ideas, ie, a national public works bank, bond banks, or revolving trust funds;
- Develop ways of reducing the much criticised delays in initiating new public works programmes; and
- Explore ways of involving the private sector in the provision and funding of infrastructure services.

The proposed bodies would ultimately have to be responsible to elected politicians who have the responsibility to see that the economic infrastructure is adequately maintained and extended, but this should not prevent the Commissions from being set up and operated with a meaningful degree of independence in their assessments and recommendations.

It might be felt necessary in one or more of the countries covered by this report for a fourth function to be given to the proposed Commission

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65 For a UK official response to this criticism see *Investing in the Public Sector Built Infrastructure:* The One Year Funding Cycle. Note by the Treasury to the National Economic Development Council, June, 1985.

66 *Hard Choices,* op.cit.

namely to act as an excutive arm with power to initiate and supervise major projects.

If given this executive function, a Commission of the sort proposed would be able to undertake projects which are on a national scale. There may indeed be a case for an executive authority to be responsible for major infrastructure schemes, but such a function would compromise the effectiveness of a Commission with the three major tasks set out above. The need for additional functions can be assessed from time to time and the best means of carrying out any agreed new responsibilities would have to be determined in the light of local experience.

In the United States, it remains to be seen to what extent the National Council on Public Works now set up under the Public Works Improvement Act of 1984, will assume the three roles which are set out above. Provided it proves capable of fulfilling the limited tasks assigned to it, this Council could well be made permanent at the end of its term.

To sum up

Effective economic infrastructure is vital in the commercial life of a nation. Its neglect results in unnecessary costs to everyone, but especially to the wealth creating sector. The efficient renewal of infrastructure is a public duty which cannot be left to take its chance with other (always pressing) claims on public resources. To enable governments to fulfil this public duty more effectively, it is recommended that independent bodies or Commissions be established in each country to monitor and report on the effectiveness of each nation's economic infrastructure, with equivalent bodies in the States or regions. Such bodies would help to assess the needs and recommend means of funding the renewal, maintenance and needed extension of these works. The present approach is haphazard and over-sensitive to political and other pressures. As a result, the United Kingdom and the United States suffer from an increasingly inadequate economic infrastructure which, if allowed to deteriorate much further, will jeopardise future economic growth because of its effects on production and distribution costs. It is time to take this challenge seriously; and one way of doing this is for governments to set up such bodies to serve as an instrument for real progress on this matter.

APPENDIX

A NOTE ON TWO PERTINENT ISSUES: EMPLOYMENT AND INFLATION

Two questions are raised when the subject of increased expenditure on a nation's infrastructure is discussed:

- Will it generate additional employment?
- Could it lead to higher (rates of) inflation?

Though the answers to these questions depend on a number of complex factors not directly related to the construction of a highway or the renovation of a sewer system, discussion of the effects that some realignment of public spending priorities might have is appropriate.

A. EMPLOYMENT

1. The Primary Effects

Public works of any sort tend to be labour intensive and it is a matter of record that levels of employment in the construction industry respond most immediately to a rise or fall in public investment in capital projects.

In the UK the value of all construction output fell in real terms by over 25% between 1973 and 1982. During this period unemployment in the construction industry fell from 1.4 million in 1973 to scarcely over 1 milion in 1981, and has since fallen below 1 million for the first time since 1929. Smaller firms in particular are continuing to shed labour as they suffer disproportionately from the slump in orders. A public works programme is therefore top of the priorities of both management and unions in the construction sector. Estimates of the direct effect on employment of increases in infrastructure expenditure vary but that there would be such an effect is not doubted by any analyst.

In the US[1], the numbers employed in construction fell from just over 4 million in 1973 to 3.5 million in 1975 and 1976, recovered at the end of the decade in response to the Local Public Works programme, reached 4.5 million by 1980 and rose to over 6.5 million by late 1983, again partly as a result of the provisions of the Surface Transportation Act of 1982 and the Emergency Jobs Appropriations Act. Unemployment in construction fell from just over 1 million in November 1982 to nearly 760,000 a year later. Estimates prepared by the US Department of Commerce indicate that the direct employment effects of the Surface Transportation Act, which is injecting an additional $23.4 bullion over 4 years into highway, mass transit and airport construction, would be to save or create 95,000 jobs in construction.

Some further indication of the job-generating impact of public investment is contained in a review of the Bureau of Labor Statistics' monitoring of construction activity.[2]. Broadly this indicates that some 24,000 workers were employed for one full year for each billion (1980) dollars spent on new construction of buildings, houses and highways. Data Resources Inc. estimates that each billion (1984) dollars spent on new construction creates 32,000 jobs[3].

In Canada the labour force was shielded from the effects of the recent recession for longer, and employment in construction rose steadily from 409,000 in 1972 to

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1 For a comprehensive review of the US literature on this topic see *Job Creation & Public Works Investment: a Review and Analysis of the Literature* by Rita Bamberger, Urban Institute, Washington DC, 1984.

2 R. Ball, *Employment Created by Construction Expenditures*, US Department of Labor, Monthly Labor Review, Washington DC, 1981.

3 In *America's Infrastructure: Effects of Construction Spending*, AGCA, Washington DC, 1984.

546,000 in 1981, though there had been some small falling away in the late 1970s. When the recession bit in 1981 and 1982, the national unemployment rate almost doubled. The service sector, which provides about 70% of total employment, was almost unaffected and the brunt was borne by extraction industries, construction and manufacturing. Output in construction, which had risen by 17% between 1973 and 1977, fell by 6% from 1978 to 1982. In transportation equipment a 43% rise became a 21% fall. The 1983 budget announced a 1 billion dollar public works programme, due to be implemented in the financial year 1984-85[4].

2. Secondary Effects

Any stimulus to capital investment will have a spin-off in other sectors. Initially this will be concentrated in firms supplying the construction industry – building materials suppliers, manufacturers of heavy plant and transport equipment in particular.

The extent to which an initial investment creates employment in its secondary and tertiary effects is to some degree contentious, and proponents and opponents of the principle of public investment as a means of job creation tend to maximise or minimise its impact in accordance with their existing preconceptions. In the UK, the TUC Economic Review claimed that for every job created in construction (on- and off-site), another would be created elsewhere in the economy. The US Department of Commerce has predicted a similar proportion arising from the effects of the Surface Transportation Act. Of 49% extra employment in non-construction sectors 18% would be in durable goods manufacturing and 21% in services (chiefly transport).

However, studies carried out in the US on the effects of Local Public Works programme, enacted in 1976 and 1977, have reached widely differing conclusions on its precise job creation consequences and on the relationship between investing a specific sum on capital projects and long-term reductions in employment. Any precise calculation of direct and indirect impacts on unemployment made in support of the case for increased infrastructure expenditure must therefore be treated with some sceptisism.

3. Long Term Effects

A number of estimates have been made by concerned organisations of the anticipated long term effects on the economy and employment of particular public investment programmes. In the UK, the TUC's proposal in its Economic Review 1983 for a £10 billion recovery package includes £3.2 billion to be spent on infrastructure projects (notably housing), which is forecast as creating 600,000 jobs, half in construction and half in other sectors. (This does not include the reflationary effect of other aspects of the package in manufacturing and other sectors). The additional expenditure would be financed by extra borrowing.

On the other hand, the CBI and organisations representing the civil engineering and building industries in the United Kingdom have argued that new investment should be funded by redistributing existing expenditure. Reports prepared by economic and econometric research groups have analysed the various options on either their own or the Treasury's macroeconomic model of the economy. The Economist Intelligence Unit estimated that financing £2 billion of capital investment in each of three years by sales of government stock would create over half a million jobs within the three years[5]. Where the expenditure was financed by cutting current spending, the easing of unemployment was slower, but after four years, growth

4 Canadian Budget Statement, Dept. of Finance, Ottawa, 1983.

5 *Capital Spending and the UK Economy*, a computer study by the Economist Intelligence Unit Ltd., London, 1981.

would be concentrated in manufacturing output and employment. Restricting public-sector wage increases and the real value of rises in pension and other benefits reinforces this trend.

In 1981 Cambridge Econometrics estimated the effects of £500m of investment in one year according to five different programmes. They concluded that the two construction options considered (increased public sector housebuilding and rehabilitation, and spending on roads, sewers and other public works) offered better growth potential in terms of increased output, investment and productivity than increasing current expenditure, cutting income tax or offering employment subsidies. In terms of new employment the construction options both created over 60,000 jobs directly or indirectly. Employment subsidies created over 135,000 but at much greater cost to the PSBR and ignoring the fact that the extra employment is not adequately reflected in increased output[6].

The employment effect of increased infrastructure spending in OECD countries was considered by the OECD in February 1984. In a background paper[7] for an inter-governmental conference on Employment Growth in the Context of Structural Change, John Evans of the European Trade Union Institute based in Belgium estimated that the job creation impact (direct and indirect) of a billion dollars of investment would yield between 68,000 man jobs per year and 35,000 depending on the labour intensity pattern in the OECD respective country in his survey.

New permanent jobs would be created in the construction industry and indirectly in a number of others by devoting more resources to infrastructure. The problem lies in the impacts of the method chosen for financing the new works. Diverting resources from current public sector expenditure is one way, though its political consequences would be severe and its overall employment effects are doubtful. Borrowing from the savings pool by whatever method could both 'crowd out' other types of capital expenditure and put pressure on interest rates to rise.

It is because this additional demand for capital would inevitably be reflected in interest rates that the inflation question is raised when there is a call for additional resources to be devoted to infrastructure renewal.

B. INFLATION

An objection frequently raised to increasing Government capital expenditure is that it would be inflationary. An important part of this objection is that the additional capital spending would increase Government outlays as a whole. This would not necessarily be the case, as will be explained more fully. First, the proposition that additional Government expenditure *in toto* is inflationary, will be considered.

1. Increased Total Expenditure

The argument that additional Government expenditure is inflationary rests, in the first place, upon the proposition that such expenditure creates, or enlarges, the public sector deficit.

The mechanics whereby the Government finances its continuing expenditures, at least in the UK, certainly bears out the essence of this proposition. The UK Exchequer covers the balance between its outgoings and revenues, on a day-to-day basis, where these are deficitary, by selling Treasury Bills. The London discount market has accepted a standing obligation to buy all such Bills. In order to buy these,

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6 *Policies for Recovery*, Cambridge Econometrics Ltd., Cambridge, 1981.

7 J. Evans, *Employment Generation through Public Infrastructure Investment*, OECD, Paris, 1984.

it normally borrows from the banking system as such. In any case it pays for the Bills by cheques on its deposits with the banks. The Government thus receives bank deposits in exchange for its Treasury Bills and is able to finance its transactions with the private sector, ie: to pay for those purchases of goods and services not covered by incoming revenues. In due course a proportion of the Treasury Bills themselves will find their way into the banker's hands.

To the extent that the day-to-day gap between revenue receipts and Government payments is not covered by the sale of Treasury Bills, the private sector will go into surplus vis-a-vis the public sector and the banking sector's balances with the Bank of England will grow. Since both balances with the Bank of England, and Treasury Bills, constitute first line liquid reserves for the banking system, on the basis of which banks may increase their lending and deposits, any Government deficit will add to the money supply.

Thus, as a budgetary deficit works its way through in the course of the year, the money supply increases. However, at the same time as Treasury Bills are bought and sold by the Government and the banking system, another process is at work. This is the long term funding of Government debt by sales of Government bonds or 'gilt edge' stock, to the general public outside the banks. This operation has in the first place the function of putting Government borrowing on a longer term basis, but also, most important, of counteracting the money supply – creating effect of Treasury Bill sales. Clearly when a member of the public outside a bank buys a Government bond, that person will use a bank deposit for the purpose. The bank deposit in question will shift out of the private sector and will be taken into the possession of the public sector. By definition this is a reduction in the money supply; and wherever, over a full year, funding of Government debt to the general public is equivalent to the PSBR itself, there will be no net creation of money.

It remains a fact that Government policy in the UK for many years past has been directed to the total funding of the PSBR, so that there has been no effective money creation through the PSBR for the better part of 10 years. Nonetheless, the danger of money creation inherent in the Government financing mechanism is always present.

This situation does not occur in the United States. The US Federal Government indeed finances itself, at short term, through the issue of Treasury Bills and there is a market in these in which the banking system participates. However, Treasury Bills are not an essential part of US Banks' reserves. The liquid assets which United States banks are required to hold, and which form the monetary base from which their lending and deposit operations are launched, are their balances with the Federal Reserve and their cash in hand. Thus the liquidity of the United States banks is held by, and controlled by, the Federal Reserve, itself a constitutional arm independent of the Federal Government. The Federal Reserve decides upon the liquidity of the American Banks and consequently on their capacity to lend and to hold deposits and, through this, the level of money supply. The deficiency posture, or otherwise, of the Federal Government, and its method of financing this deficit, are in this context immaterial.

2. Money Supply Increase and Inflation

Does an increase in the money supply then, effectively lead to inflation?

For many years it has been entrenched monetary doctrine that any expansion of the money supply must result in a rise in inflation. This doctrine is based ultimately on the quantum theory, which presents the truism that an increase in the quantity of money in circulation, where there is no change in the quantity of goods and services for sale, must translate itself into a rise in prices. However, the full exposition and application of the theory has run into difficulties. In the first place, it has proved

virtually impossible to define money with any degree of practical accuracy. Secondly, despite the implicit purity of the theory, it has, in practice, proved impossible to define the exact series of links through which higher money supply translates itself into higher prices. Thirdly, it has proved virtually impossible to design a complete and reliable mechanism whereby money supply growth can be measured – and curtailed. Finally, there are some fundamental doubts as to whether a quantum based theory, devised and certainly found to work in an earlier age when money was a physical commodity the supply of which was entirely a matter of mineral output, can usefully be applied now in an age where money is no more than bankers' credit, the supply of which is determined essentially by the demand for it. In the latter case, the relationship may well be reversed: high money supply may be the consequence, rather than the cause, of inflation.

3. Excess Demand

There is another aspect to the inflationary argument. This is that excessive government expenditure can be inflationary through the creation of excessive demand; which in turn is inflationary by diverting, through government debt funding, private sector savings away from productive investment. This is an argument which has equal force both in the United States and the United Kingdom. Moreover, in terms of practical and measurable evidence, it has greater force. In an economy such as the UK, where general government spending is equal to nearly 50% of GDP, and where even in the United States the proportion is just over 30%, any excessive expenditure by the public authorities must inevitably entail higher initial demand for goods and services and in increasing incomes. This will lead to further private sector demand for goods and services which, with unchanged output, will lead to a rise in prices. Similarly, funding operations of government, leading to a draw on gross private savings of nearly 50% of the total in the United States and to some 25% of all Stock Exchange transactions and 60% of net capital issues in the UK, must give rise to concern over the amount of resources remaining for private investment.

However counter arguments exist. Government deficits, it has been pointed out, are cyclical. They are large when economic activity is low – ie: welfare benefits transferred by the public sector are large, and therefore, by definition, when the private sector demand for investment capital resource tends to be low; and Government deficits are small at a time of high economic activity. It has certainly been difficult, in practice, to demonstrate that public sector borrowing has at any time starved the private corporate sector of funds which it requires. It is also argued that the notion of higher inflation resulting from excessive demand is predicated on the assumption of unchanged output. However, as already indicated, higher public sector demand is most likely to increase private sector output, with an accompanying counter-inflationary effect; this is certainly true where the starting point is low overall activity and low use of capacity. Monetarists would also argue that although excessive government spending may well increase demand, this demand cannot physically be gratified unless an equivalent increase in the money supply is permitted; the mechanism of UK funding and Federal Reserve Control can ensure that this is not done.

4. The Effect of Additional Spending

Nonetheless, contemplation of a long period of high government spending, accompanied by high government borrowing merely to nourish further government spending must lead to a general conclusion that the ultimate result will be overall excessive demand and consequent price inflation. Indeed the history of the post-war

years in the United States, Canada and the United Kingdom would suggest that this has been the sequence of events.

The inflationary, or non-inflationary effect of government spending depends, in the first place, on whether there is an increase in the overall volume, and in the second place, what the nature of that spending is.

It is being suggested in this report that government expenditure on capital purposes has been low and declining which has led to a serious deterioration in the physical infrastructure of the economies concerned. This means by implication, that the nature of the spending advocated is most unlikely, in itself, to have an inflationary effect. What is called for is higher investment as opposed to higher consumption. If government expenditure is concentrated on consumption, ie: on the purchase of goods and services it leads implicity to more demand on output, or to high payments for labour directly employed by the government. This in turn leads immediately to high incomes with no parallel increase in output and then the effect must, certainly over the longer term, be inflationary.

To sum up. If the government's expenditure is on properly evaluated infrastructural assets (which will reduce the cost of and facilitate the extension of the physical wealth creating activities of the economy), then the economic effect cannot be inflationary. There can be inflationary results only if the expenditure is wastefully employed ie: not for the creation of genuine cost saving or revenue enhancing assets.

Provided there is no wastage of this sort and the expenditure indeed results in the emergence of a larger or at least a more efficient national infrastructure, then clearly the expenditure has led to a growth in GDP; and where the infrastructural expansion has been wisely chosen then the growth must equate to the additional expenditure, and thus remain non-inflationary.

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